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The Physiotherapy Review

Volume XIV Number 3

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The Use of Physical Therapy in the Treatment of Multiple or Peripheral Neuritis

G. G. Martin, M. D.*

The clinical syndrome known as peripheral neuritis occurs with sufficient frequency to warrant a consideration of the use of physical therapy in its treatment. We have referred to our physical therapy department for treatment, a considerable number of patients with this clinical entity due to a great variety of causes. The actual number of patients seen with condition due to any particular cause, is not great. I am limiting my discussion to the treatment of those patients who fall definitely in this clinical group. I am not including the group of patients who present localized pain of an indefinite etiology, which is frequently classified as neuritis.

The etiology of the syndrome under consideration is quite variable and at times it is quite difficult to determine the exact cause for the particular patient. From the viewpoint of the physical therapist, it is important, but it has been sufficiently discussed in the neurological texts to require no elaboration. The clinical signs and symptoms which occur as the result of peripheral or multiple neuritis are of greater importance. They may be secondary to inflammatory or degenerative changes in the nerve. Careful study of a patient is necessary for an intelligent application of physical measures. The clinical signs and symptoms can be divided into three groups:

I. The first group is the result of involvement of the motor fibers of the nerve. This is present to a variable degree. It results in a flaccid type of paralysis which is similar to that seen in anterior poliomyelitis.

II. The second group of symptoms consist of sensory changes. These are demonstrated by a loss of sensation, areas of anesthesia, loss of deep sensation, including sense of position, vibration sense, etc.; hyperesthesia with pain over the distribution of the nerve, tenderness along the nerve trunk; paraesthesia with various abnormalities of sensation, of which the most prominent are burning and tingling sensations. The patient often complains that the part feels lifeless.

III. The third group of changes noted are trophic disturbances. Edema is frequently seen. Early, it may be a soft, pitting type of edema. There is, however, a marked tendency toward fibrous tissue formation. This may change the picture of the edema to a rather firm, non-pitting type. This fibrous tissue is also deposited around the joint structures and particularly the periarticular structures, including the capsules and ligaments of the joints. It is deposited around the muscles, tendons and other soft tissues. Contractures and other deformities occur and frequently occur rapidly. Wasting of the finger pads, nail changes with brittleness, and alteration in shape are noted. Falling hair, a hyperkeratosis of the palms and soles, and other changes are frequently seen. The amount of wasting of the soft tissues is frequently extreme. Atrophic changes in the skin with a smooth, glazed appearance is noted. Fixation of the skin to the underlying soft tissues and to the underlying bone, occurs readily, and is particularly noted in the hands and feet.

Every patient presenting this clinical picture must be studied carefully with the above three type changes in mind, before a satisfactory application of physical therapy can be made.

While all three types of changes are usually noted, there is marked variation in the relative extent of these changes. When the condition is secondary to such infections as diphtheria, typhoid fever, streptococcal infections, etc., and certain intoxications such as lead poisoning and serum diseases, the findings are apt to be predominantly motor. Trophic disturbances are present but sensory disturbances are at a minimum. Certain poisonings such as alcohol and arsenic on the other hand, give rise to predominantly sensory disturbances, with a considerable amount of trophic disturbance. Motor disturbances arise when the condition is more severe.

A study of each individual case is necessary, however, as the findings cannot be predicted from a consideration of the cause alone.

All these changes become progressivley more marked as we approach the periphery of the involved nerves. Recovery occurs from above downward towards the periphery. As the result of this, most of our treatment must be directed towards the distal parts of the extremities, as it is here that the changes are the most marked and that recovery is delayed for the longest period of time. Evidence of recovery is usually noted in the proximal areas relatively early and it is usually complete. This tendency to delayed recovery in the peripheral parts is particularly unfortunate in the upper extremities. It is a difficult problem to secure a satisfactory degree of recovery in the hands. The feet present a similar problem but the movements they perform are not so complicated and the functional result is usually better. The majority of these patients make a complete recovery with the exception of the hands. A complete functional recovery of the hands cannot always be obtained, if the recovery is delayed for many months.

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PHYSICAL MEASURES

A consideration of the different physical measures must include the consideration of heat, massage, active and passive movement.

Heat is of value in most cases. It must be carefully applied when sensory changes or trophic disturbances are marked. Anesthesia is particularly dangerous. Any patient with marked trophic disturbances will receive burns at temperatures which normal tissues will tolerate readily. This is partly due to a failure of the circulation to respond in the usual way. The usual increase in the rate of circulation with dilatation of capillaries is delayed and the heat is not dissipated as quickly as usual. If the heat is gradually applied and a greater time is taken to reach a maximum temperature, a more satisfactory circulatory response will occur. We have found radiant heat and light from Tungsten filament sources to be the most valuable source of heat. The selection of the size of the bulb and reflector is dependent upon the extent of the involvement. The duration of the exposure of the particular area should be at least thirty minutes and preferably up to forty minutes. In cases with extensive involvement, the use of a general light bath with apparatus suitable for giving radiation in bed or in a suitable cabinet in which the patient is lying down, is very satisfactory. In less severe cases the ordinary cabinet bath may be used. In less extensive cases, the suitable reflectors should be selected to cover the involved area.

General light baths cause severe perspiration, and plenty of fluids should be given the patient to drink during the treatment. The temperature should not be high enough to cause prostration or weakness. It is safer to use lower temperatures for longer periods of time. In many mild cases of alcoholic neuritis, daily radiations of this type are all that is needed, and improvement will readily occur.

Diathermy can be used to replace radiant heat and light, but has not proven satisfactory. We use it only when there is extensive involvement, and when satisfactory apparatus for giving radiant heat and light is not available. It can be given by connecting an electrode around each wrist or around each ankle in treating respective extremities. This concentrates the heat in the distal parts of the extremities but as that is where the involvement is most severe, this is not altogether a disadvantage. The biggest disadvantage lies in the fact that it does not give heat to the most involved parts, that is, the hands and feet. Radiation from a small hand lamp can be used to supplement diathermy so far as the hands and feet are concerned.

Heat is valuable in improving the circulation and frequently in the relief of pain. It is also valuable in reducing the tendency to trophic disturbances.

Massage is particularly valuable in combating trophic disturbances. The type of massage and the area to which it is to be applied is governed by the type of trophic disturbance present. If the maximum benefit is to be received, it should be given as soon as possible after the application of heat. Frequently the extent of the involvement is so great, that all the attention must be given to the distal parts of the extremities and the proximal portions must be neglected.

Massage is valuable in keeping down the edema when it is present. It is useful in keeping the skin soft and pliable and in preventing adhesions of skin to the deeper structures. It is useful around the joints particularly when combined with passive movement. It is easier to prevent fibrous adhesions around the tendons and muscles than it is to loosen them up after they have once formed. The remobilization of muscles and joints that have become fixed in fibrous tissue, is a long tedious process. If this fixation is combined with a considerable degree of muscle weakness, it increases the difficulty in securing a satisfactory return of muscle power. If pain is a marked feature or tenderness of nerve trunks is present to any great degree, massage may have to be applied very carefully at first. Most patients will be benefited from it as soon as the diagnosis is established, if it is intelligently applied. An understanding of the changes present is necessary for satisfactory application of massage. Maximum benefit can be obtained only after a careful study of the patient on the part of the physician and technician, and with the administration of the massage by a technician who has a definite objective in view.

Passive movement usually is indicated, and should be given early and frequently enough to prevent fibrous tissue formation around the joints. This should be combined with massage to prevent limitation of movement due to fibrous tissue. In carrying out passive movement of the joints, the usual care must be taken that no particular movement of the joint is over-looked. If passive movement is carried out carelessly, this can easily occur. The same is true of carrying out active exercise. A long period of disability may result from carelessness in this regard. A periodic check by the physician is desirable to prevent this. The whole responsibility should not be placed on the technician's shoulders.

The above three measures are valuable in preventing or limiting the trophic changes which occur. The treatment should be commenced as soon as the diagnosis is established. Too frequently these changes occur rapidly and are well advanced before treatment is started.

When muscle paralysis is present, careful splinting and support (to prevent over-stretching of muscles and other types of deformity) is as necessary here as it is in the case of other types of flaccid paralysis. The greater the tendency towards trophic changes, the greater the necessity for this support. It is too frequently neglected until serious damage has been done. Rest for muscles weakened as the result of peripheral neuritis, is as important as it is in the treatment of anterior poliomyelitis. The assistance of a skilled orthopedic surgeon is necessary in extensive cases, unless the physician has unusual experience in the application of splints and appliances for this purpose.

In some patients muscle weakness and atrophy may be the predominating feature. Little can be done aside from the use of the above, until evidence of returning nerve function is noted. Careful muscle examinations are indicated and muscle training should be carried out along the same lines as in the treatment of anterior poliomyelitis. In most patients a remarkable degree of recovery occurs. It is seldom that a nerve is permanently damaged. There is nothing that can be done to influence the rate or completeness of this nerve recovery. The treatment must be directed toward maintaining the soft tissues and joints in the best possible state of nutrition and preventing as far as is possible, the development of fibrous adhesions. The relief of pain is desirable. As nerve function returns the gradual redevelopment of atrophied muscles is necessary.

The problem of muscle training is as a rule not as difficult as it is in poliomyelitis. Recovery occurs, as stated above, from the proximal distribution of the nerve toward the periphery. There is not as much difficulty with irregular return of muscle strength in opposing muscle groups. The period of time necessary for complete return is variable. It may be a few weeks or

it may be as long as eighteen months. The use of a pool with under water exercises is of considerable value. Most of these patients are adults and exercises of the proximal muscle groups is a difficult problem without it. Satisfactory results can be obtained from a good exercise table, if care is used.

In involvement of the upper extremities, a considerable proportion of the time should be spent on the hands. These carry out fine co-ordinated movement and a satisfactory return of function is difficult to secure. The proximal portions of the extremities should be neglected if a complete tretment is not possible in extensive cases.

The use of electrical stimulation is of questionable value. It must be used with great care. It is frequently more harmful than beneficial. We do not use it as a routine procedure. We occasionally use it to the distal parts of the extremities, if the condition is severe and no tendency to recovery is noted after a few weeks. We prefer the use of small electrodes and practise stimulation from one end of a muscle to the other. Two or three contractions of each muscle are sufficient. The cases in which we use it, all require the use of galvanic current. If partial nerve degeneration is present and the nerve responds to a faradic current, recovery will occur early enough to wait for voluntary contraction. Massive electrical stimulation and the use of electrical stimulation in inexperienced hands, is in our experience, always harmful. The use of electrical stimulation to individual muscles is slow and tedious, but it is the only method of application which has given us satisfactory results.

Different Types of Neuritis

Diphtheritic neuritis is becoming a rare type of peripheral neuritis. It gives a variable amount of motor paralysis. It makes an early complete recovery unless death occurs from cardiac failure or involvement of the respiratory muscle. Muscle training is not necessary. Radiant heat and light makes the patient more comfortable and should be given in bed. Massage or passive movement is seldom necessary unless trophic changes are unusually marked. The treatment must always be taken to the bedside as serious heart disease accompanies this condition too frequently to allow movement of these patients.

Alcoholic neuritis if severe, must be treated along the above lines. Many mild cases require only the use of general light baths. Paralysis, in our experience, is only the feature of more severe cases. Considering the number of patients we have admitted with chronic alcoholic and acute alcoholic poisoning, the condition is relatively rare.

Diabetic neuritis is a diagnosis which is somewhat loosely used. Most of the patients diagnosed as this type of neuritis, do not properly fall within this classification. The etiology of their pain and other sensory changes is difficult to determine. Anesthesia is frequently present and arteriosclerosis is a prominent feature and may be of importance in causing the symptoms. Most of the symptoms are noted in the lower extremities. From the standpoint of physical therapy, the combination of arteriosclerosis and anesthesia makes the use of heat a very dangerous form of treatment. We have had so many burns that we have entirely discontinued the use of heat in the treatment of these patients. We use massage and exercise, particularly Buerger's type of exercise. This has proved much safer and we have found that it gives as much relief as did the use of heat.

Motor paralysis we have seen in only one or two patients in connection with diabetes, and these have been patients with complicating infections, which have made it difficult to be sure that the motor paralysis was not secondary to the infection, rather than to the diabetes.

Summary

In reviewing the use of physical therapy in the treatment of peripheral neuritis, we think that if the maximum benefit is to be derived from it, its application must be based upon a careful study of the changes present in the particular patient. Cooperation between the technician and physician is of greatest importance. Early treatment is necessary and the physician must refer these patients for treatment as soon as the diagnosis is established. He must see that adequate support is given to weakened muscles and that the technician is warned of the presence of areas of anesthesia and trophic changes, which will require care in the administration of heat. The physician should supply the technician with more detailed information concerning the changes which are present, than is usually given. Too much responsibility in determining the presence or absence of these changes should not be placed upon the shoulders of the technician. Frequent periodic observation on the part of the physician, and consultation with the technician is valuable in determining the changes in details of treatment which are necessary, from time to time as the patient shows improvement. The extent of the involvement is frequently so great as to present the most difficult problems referred to our physical therapy department.

Our success is rehabilitating many of these individuals has been satisfactory and we have felt our results have warranted the considerable expenditure of time and effort which has been necessary.

The History of Backache

Edward T. Wentworth, A. B., M. D., F. A. C. S.*

Backache is a modern word, but it is inconceivable that the symptom is only a modern one. People must have had backache from the very beginning. Primitive man certainly must have overstrained his back musculature frequently. The courtiers of the Middle Ages, handicapped as they were by ill-fitting clothing and the notion that gentility meant release from all physical activity must have had backache.

*Rochester, New York.
Read before the Western New York Chapter, American Physiotherapy Association, Jan. 13, 1934.

During the years in which we have been interested in the alleviation of human suffering, backache has been a much talked of and written about subject. There are over five hundred articles on it in standard English medical literature of the twentieth century. In fact, to a very considerable extent, our present conception of what makes a backache, is a conception of the twentieth century. Our conception of the treatment of backache is not entirely as modern. Ideas of treatment have withstood the searchings of scientific investigative methods

a little better than ideas of causation. Rest and physical therapy, the most primitive of all forms of treatment of backache, remain among the most important methods of treatment; and will still be among the most important methods of treatment years after some of the present operative enthusiasm has waned. Rest and physical therapy constitute the most important methods of treatment because satisfactory in the greatest number of cases, not at all because the important element in all cases.

Our conception of what makes a backache is largely a conception of the twentieth century, that is, a period of one generation. In order to emphasize the temporal instability of such a situation let us review some of the important historical medical data of the rest of the 8000 years of man's known intellectual life,—a period over two hundred times as long as the one in which our conception has been developed.

From the ancient Sumerian, Egyptian and Hebrew civilizations dating 5000 to 6000 B. C.; from the ancient Indian cilivilization dating to perhaps 3000 B. C, and the ancient Chinese or Mongolian civilization dating to about 2500 B. C., we have a few suggestions on drug therapy, massage, baths, hygiene and some surgery, but the valuable historical beginnings of medicine are in the Golden Age of Greece. Hippocrates, 400 B. C., frequented the Academy at Athens as an individual, teaching those who came. In the absence of books, and with few parchment scrolls, the method involved disputations and lectures. Hippocrates was born into the family of physicians, the race of the Aesclepiades. Aesculapius was a mythical personage, the god of the healing art. Temples were erected to Aesculapius in Greece, 1200 B. C. The priests of these temples were physicians and the temples themselves were medical schools, medical offices and hospitals. In them were praticed mysterious rites, mesmerism, hydrotherapy, purgation, cupping and bleeding.

Into the temple-school of the Island of Cos was born Hippocrates. He was taught the inherited secrets of the healing art by his father. But, he broke loose from the oath of the Asclepiades, not to divulge the secrets of the profession and left written records of great length and value for all posterity. Hippocrates' code of morals necessarily reflected the standard of the time, yet still tests the moral capacity of present day physicians. Hippocrates knew a great deal about broken backs, and backs deformed by disease. He devised machinery for the purpose of correcting such deformities. The Greeks first recognized the therapeutic value of exercise and massage. Herodicus first developed, systematically, exercises for the cure of the weak body. Hippocrates wrote a little about exercises and certain massage manipulations, but chiefly for use with reference to physical development.

Paré, a French barber-surgeon (1510-90), was attacked by Etienne Gourmelen, the Dean of the Faculté de Médécine, for not publishing in his book on surgery all of the operations of the ancients. The "Apology" of Paré (1585) is a reply. It contains the following, which is perhaps, the first suggestion of sacro-iliac fusion:[1]

"Seventh operation—In the sciatica proceeding from an internal cause inasmuch as the mucosities displace the bones from their place, Paul directs to burn the said joint down to the bone. Dioscorides commands the same, which I do not find expedient taking indication from the subjacent parts, for there, where one would burn, it is in the place of four twin muscles, beneath which passeth the great nerve descending from the sacrum, which being burnt, I leave it to you to think what would happen, as Galen remarked, expressly talking of the ustion which it is necessary to make upon the humerus."

American medical teaching was instituted in Philadelphia in 1765. The greatest medical work of the century was that of Morgani at Padua. He, for the first time, correlated clinical symptoms with pathological findings on a great scale, thus founding modern pathological anatomy. After the Dark Ages, the reappearance of information on gymnastics and physical therapeutics by the gymnasts such as Peter Henry Ling (1776-1839), founder of the Swedish system, is contemporary with the beginnings of definite discussion in the medical literature of the causes and medical treatment of backache.

The period of modern medicine began in the middle of the ninteenth century with the discovery of anesthesia, antiseptic surgery, the establishment of Virchow's cellular pathology, and the beginning of the bacteriological era. Pasteur, a chemist, demonstrated the bacterial basis of fermentation, and Koch firmly established the bacteriological basis of many diseases.

In 1876 Mosengeil reported his epochal experiments in the absorptive effects of massage. Chinese ink injected into the knee joints of rabbits was found to be much more speedily and thoroughly removed from the joint and absorbed by massage, than under ordinary conditions. During the last quarter of the ninteenth century studies in earnest upon metabolism, action of muscles, reflex irritability, blood pressure and other physiological phenomena were in progress. Definite knowledge of the improvement in general well-being, arising from exercis: involving motion of the viscerae, has all come to us within the last forty years.

That information which has come to us upon backache from the period preceding the nineteenth century is, with few exceptions, so slight that any concept of what people thought about backache has to be largely imaginative. Comparatively speaking, there is a dearth of information in the medical literature upon the subject, previous to the twentieth century. There are about one hundred articles in the literature of the nineteenth century, one half of which deal with tuberculosis of the sacro-iliac joints and the pelvic relaxation of pregnancy.

The progress of thought through the nineteenth century seems to be almost entirely a matter of drifting. There was no outstanding individual who advanced a definite idea which was generally accepted and acted upon by the rest of the medical profession. Progress during the twentieth century is accompanied by much spirited partisan discussion on the part of individuals who have advanced definite ideas and have been able to impress their followers with the value of such ideas. Pride of opinion and allegiance to authority are involved in the continued controversy over the pathology and treatment of low back complaint. It requires a conscious effort to bring this pride of opinion and allegiance to authority out into the open and to rethink problems and solutions in the light of additional knowledge. We are still too close to this active belligerence to be entirely certain concerning the truth and error of some of these teachings. Therefore, it behooves us all to be entirely open-minded and very earnest in our continued search for a better understanding of the problem. Therein lies the practical importance of accurate and detailed information on the knowledge available to the pioneers of the twentieth century.

Curiously, although Richard Cabot in 1905[2] referred

to the just published work of Goldthwait and Osgood upon the sacro-iliac joints as a "new disease," these joints have been known as a source of back symptoms from the beginning of medical literature. Hippocrates knew and commented upon the relaxation of the pelvic symphyses during pregnancy and following parturition. One finds many statements in the English literature of the nineteenth century that the European writers of the Middle Ages frequently spoke of it, but the first definite reference I have found was by Paré, in the middle of the sixteenth century. The condition is well attested through the first part of the ninteenth century.

Finally, Snelling, in the American Journal of Obstetrics of 1870,[3] gave an account which has hardly been improved upon. "The affection consists of a relaxation of the pelvic articulations, gradually developing during pregnancy or suddenly developing after parturition, permitting a degree of mobility of the pelvic bones, which gives rise to distressing and alarming sensations and hinders locomotion." Snelling cited many cases and many theoretical explanations, and concluded that he thought it proven that varying degrees of relaxation are obtained in the pregnant and puerperal condition of a physiologic and benign character, and that it is the excess alone of this condition which institutes symptoms. He stated that the ligaments become saturated with serum and lose their firm and resilient qualities. The synovia is greatly increased, pressing the bones asunder. The pelvis becomes incapable of sustaining the weight of the body, and so gradually yields to the weight above. Or, some slight and insignificant movement of the patient suffices to precipitate the symptoms suddenly. He recorded many examples of this condition in animals, and stated that it is even more marked than in humans. He said that the relaxation can be recognized by bracing the pelvis with both hands and allowing the patient to walk, also by palpation over the symphysis.

He spoke of inflammatory conditions in the joints, and even bone caries and cited cases of post-mortem findings of tuberculosis in the pelvic joints, and elsewhere in the body as complications. Apparently, he did not appreciate that tuberculosis is apt to become active during pregnancy.

Goldthwait and Osgood, however, in 1905,[4] first introduced the idea that menstruation alone is enough to bring about a symptomatic relaxation; and that symptomatic relaxations and strains may exist in man and even in children. There are numerous descriptions of gross dislocations of the sacro-iliac joints from trauma, in the nineteenth century literature, but Goldthwait and Osgood first introduced the idea of subluxations of the joint, that is very slight slippings between the irregular surfaces of the sacrum and the ilium. They said that this abnormal mobility might be due to injury, (lifting strains, falls); to disease; or to general lack of muscular and ligamentous tone. At the time of their first publication they felt that the "stitch" in the back following strain or overwork, is in most instances due to such slipping of these bones.

But before going further into the twentieth century ideas, let us finish with the ninteenth century ideas on sacro-iliac disorders. There is a wealth of material on tuberculous disease of the joints. Boyer described it in 1821[5] as a "chronic, scrofulous affection of the sacro-iliac joint." Up to the middle of the nineteenth century, diagnosis of the disease was chiefly confined to a recognition of its final or suppurative stage. Brodie, in 1828[6] spoke of referred pain to the groin and along the sciatic nerve in connection with the disease. Ericksen, in 1859[7] while speaking of the disease as strumous and as partaking of the nature and ordinary character of white swellings, appreciated fully that the condition was what we now call tuberculosis. At that time, the cellular pathology of tubercles was not yet known; and it was twenty-two years before Koch had discovered the bacillus which was also named for the characteristic lesion. Ericksen was concerned about the activating cause, was uncertain about it; but, at least he was not able to trace it to injury in any case. Much of diagnostic importance came out of study of tuberculosis of the sacro-iliac joints, which has been of value in our work in the milder types of sacro-iliac lesions.

In the 1870's other types of infection[8] were recognized, but there is no mention of hypertrophic arthritic complications in connection with the sacro-iliac joints in the nineteenth century. This Goldthwait introduced particularly with reference to referred pains, which, he said, were undoubtedly due to the pressure of the hypertrophic tissue upon the lumbo-sacral cord as it passes over the articulation. One of the important conclusions in Goldthwait's and Osgood's paper is that chronic arthritis of the spine and sacro-iliac joints plays a prominent part in backache.

In 1897 mechanical sacro-iliac joint disturbances were picked from that very comprehensive group of backaches called lumbago, by Hutchinson.[9] He described cases which are typical of what we know as sacro-iliac sprain, relaxation or subluxation. In fact, Hutchinson definitely stated, "As to the structures which are involved in lumbago pain, I feel no doubt that they are the ligaments of the sacrum and the cartilage between the sacrum and the iliac bones. If we believe that lumbago has its primary seat in the sacro-iliac articulations (cartilage and ligaments), from which it radiates over adjacent parts, I do not think that we shall be very wrong." Eight years later Goldthwait and Osgood expanded this conception of symptomatic strain of the joints by pointing out the static strain upon the joints from standing in extreme lumbar lordosis; from lying supine in a sagging bed; and the decreased pelvic stability due to certain congenital, structural anomalies. Up to the time of Goldthwait and Osgood, it has been generally accepted by the profession, that motion did not exist in the sacro-iliac joints except as a phenomenon associated with pregnancy.

In order to carry through our discussion of the sacro-iliac joints, it has been necessary to get years ahead of the nineteenth century conceptions of backache. We have seen how ideas on infectious joint conditions developed; how the idea of pelvic relaxation as a cause of symptoms advanced from that of pregnancy and the puerperium, to the menses, and to the male.

We will now see that postural strain or static backache is not entirely new. C. F. Taylor, in 1864,[10] showed that in the middle of the nineteenth century, American women, who could afford it, suffered from a then fashionable condition called "spinal irritation." Doctor Taylor condemned the terminology thoroughly, and described the nerve exhaustion and physiologic imbalance between the amount of work the back musculature was called upon to do, and the amount and tone of musculature with which to do it, as well as it ever has been done. His thesis is a very modern statement of the causes of static backache: poorly developed musculature, improper position of the spine in the standing position, high heels and improperly fitting cloth-

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ing, inadequate support of the lumbar spine in the sitting position, bad chairs, constant stretching of the lumbar musculature in bed (feather beds and sagging springs). He started the campaign against uterine malpositions and uterine diseases as the causative agent in backache—a campaign which was gradually joined by the gynecologists themselves, until now the gynecologist has shifted the burden of backache in women almost entirely to the orthopedist.

The term "irritable spine" gradually gave place to "neurasthenic spine," but had not left the literature in 1903, when it was used by Robert W. Lovett of Boston.[11] He added nice wording to the backache from poor posture, when he said that when in a fatigue position, one stands by ligamentous rather than by muscular support. He concluded that the real cure lies in the development of spinal muscles and the acquirement of the erect attitude by gradually graded gymnastics, but he really made no advance beyond Taylor, forty years before. He merely mentioned the fact that in lateral curvature, pain is often seated in the sacro-iliac joint, and without mentioning sacro-iliac disturbance, he cited a case of low backache, gradually slightly improving by the use of a pelvic girdle. But, it is perfectly obvious, that in 1903, Lovett was not considering the sacro-iliac joints as an important seat of low back pain in men or women.

The nineteenth century literature contains references to a considerable list of conditions which occasionally cause backache: gastric ulcer, aneurysm of abdominal aorta, abdominal tumors, diseases and displacement of the abdominal and pelvic viscera, the loaded colon, cord tumor, meningitis, and the backache associated with acute exanthemata.[12] With that exception, through the latter part of the nineteenth century, there was a tendency for physicians to make of backache a disease entity. Some got the idea of postural strain and physiologic muscular imbalance. Many got the idea of traumatic ligamentous strain of the pelvic articulations. But, for the most part, backache was "lumbago."

In 1859 Newman[13] opened an article on lumbago as follows: "The disorder is far from being uncommon—and the placards in the railway stations, exhibiting some pitiable figure worn and bent with pain, with hand on hip and contracted brow, only serve to tell how much the public and the quacks are interested in the malady."

To Newman, lumbago was rheumatic and myalgic. The differentiation was made largely by urinary examination. The rheumatic type was associated with joint symptoms and usually followed exposure to cold. The myalgic type was not associated with joint symptoms and was acute in onset. In the rheumatic type the urine was scanty, of high color and specific gravity, and contained large and abundant uric acid crystals. In the myalgic type, the urine contained calcium oxylate crystals and triple phosphate crystals. Treatment of the rheumatic lumbago was alkalies and sedatives, with colchicum and warm applications. The treatment of myalgic lumbago was quinine and rest.

In 1881[14] G. Johnson expressed the opinion that in the majority of cases backache had its seat in muscles, representing strain or overfatigue, pain continuing through a period of bed rest, aggravated by the first movements after rest, but diminishing after moderate exercise. He advanced the theory that a contributing cause was to be found in what he called a muscular dyspepsia, that is, improper food brought to the muscle because of overeating with faulty digestion and assimilation. In 1893, Tyson[15] stated that the most common cause of backache was of muscular origin, from overstrain or exposure to cold. He also mentioned imperfect primary digestive and secondary assimilative processes.

The literature would tend to show that the association of backache with kidney disorder has never been entertained by the profession, but is a lay opinion.

As late as 1896, F. H. Edgeworth[16] was still laboring with the classification of lumbago; but had advanced to the point of considering rheumatic lumbago to be a myalgia or a neuritis, and analagous to rheumatic arthritis. In other words, he believed that the pathologic process, whatever it might be, which caused painful symptoms in joints, muscles and nerves, had a common etiology.

Hutchinson, in 1897,[9] took the first bold step in lifting backache out of the diffuse conception of lumbago; by instituting the idea of ligamentous strain. He believed that the pain of lumbago was not in muscles at all, but in movement at the sacro-iliac synchondroses. He considered it a sleeping pain, wakened not by pressure but by movement.

Hutchinson's pronouncements, however, still left the physicians with backaches which did not come from the sacro-iliac joints. There still seemed to be room for the term lumbago. In 1904, Sir William R. Gowers[17] gave final creditable position and clinical entity to lumbago. Freely quoting, his thought was that the seat of lumbago is the fibrous tissue of the muscle, wherein are located the sensory nerve endings. It is not, however, an affection of these endings alone, but may extend along fibrous tissue in any direction. For example, in "sacral lumbago," the inflammation is primarily in the tendinous structures at the back of the sacrum, and may spread, apparently by fascia to the sciatic nerve, where it may involve primarily and only, the fibrous sheath of the nerve, or may spread from the sheath to the interstitial tissue of the nerve; impairing the conducting function of the fibers so as to cause muscular wasting and diminution of sensibility. He suggested the name "fibrositis" for this inflammatory process, because of its analogy to cellulitis. He felt that inasmuch as the rheumatic inflammation of muscular rheumatism had been recognized so long, the term "fibrositis" might very well have been previously used. The features of the malady differ from ordinary inflammation in that there is no formation of inflammatory products, but it has an acute course. It may come on very suddenly, and may be the result of exposure to cold.

The sudden onset, however, he felt, was often apparent rather than real; for example, first being noticed on the first motion in the morning; also being first noticed after a period of slight discomfort in the muscles and instigated by some unusual action in a gradually developing oversensitive tissue. In other words, the production of pain might be sudden, but the condition upon which it depends, gradually developing. The pain is never spontaneous, differentiating it from neuralgia. He differentiated the definite form of fibrositis induced by sudden violent tension on tendinous and ligamentous structures. traumatic in origin. He pointed out the necessity, in diagnosis, of bearing in mind that the process might be present in, and the pain might be felt in the group opposing the one under activation because of the condition of perfect muscle balance. He pointed out that the pain from tension on the fibrous attachments of the muscles of the back to the sacrum

was greater than the pain from local pressure, due to the fact that any tension produces pressure on the many sensory nerve endings in the intermuscle fiber fascia. He said the same situation pertains to ligaments, particularly spinal ligaments.

It is the peculiar relation of the pain to tension which establishes its genuine character. He recognized the tension of chronic strain from bad posture, occupational positions, etc. He stated that the fibrositis involving tendinous structures was of much longer duration than that of muscular structure. He recommended diaphoresis and rest as the cardinal measures of treatment. In discussing this lecture, G. B. Jacobi[17] said that he had learned to palpate for the nodules of myofascitis in Sweden, and recommended deep friction massage over the affected area.

In 1911,[18] Goldthwait presented another excellent anatomical and clinical study calling attention to the wide variation in form of the osseous processes making up the lumbo-sacral articulations; the different mechanical situations present because of these variations; and the vulnerability of some of the types to strain, static and traumatic.

Although in 1886 Neugebauer of Warsaw,[19] Arbuthnot Lane[20] of London, and Turner[21] of H. M. S. Challenger, had much discussion over spondylolisthesis at the lumbo-sacral region as to whether the divided neural arch of the fifth lumbar vertebra associated with the condition, was congenital failure of fusion, fracture or an attrition process, this work of Goldthwait really established the lumbo-sacral region as one worthy of rank with the sacro-iliac joints as a source of back pain.

The past twenty-five years have been characterized by a great controversy over whether Goldthwait was right in 1905 or 1911, or both times. Numerous refinements of diagnosis have appeared. Fusion of joints to secure relief from pain has been given much attention; but no fundamentallv new conceptions of the cause of backache have appeared.

Fusion operations are done to permanently block motion at some joint or joints supposed to be the source of pain. Dioscorides, in the first century A. D., had the idea of fusion of the sacro-iliac joint to cure sciatica. In 1876 Christopher Heath demonstrated perfect ankylosis of the sacro-iliac joint in pathological specimens and took the cue that therein lay the cure for "white swellings" of joints. Fusion operations for Pott's disease rapidly followed from different parts of the world,[22] culminating in the Hibbs,[23] and Albee[24] methods in 1911. But, the basis for arthrodesis in tuberculous lesions is hardly analogous to that in non-tuberculous lesions. Early fusion of bone across a joint space, the site of tuberculosis, is for the purpose of bringing about a cure of the disease. The widespread fusion of lower spinal and pelvic joints to secure relief from pain, for strains traumatic and static, and because of chronic arthritis, has proven that the pain is not always due to motion at the suspected joint.

We have then traced the development of thought concerning the common causes of backache in two general ways; first, showing that it may come from infectious processes, from physiological relaxation of ligaments supporting the pelvic joints in the female, from muscular incompetence associated with incorrect statics and from trauma, and secondly, showing that the tissues involved may be intermuscle fibrous tissue, ligaments supporting joints of the spine and pelvis, and the synovia and cartilage of joints themselves.

The problem for the physician in the presence of an individual case is, then, to determine what physiological or pathological process is acting, what tissues are involved, and what form of treatment, systemic and local, is best adapted to the case, physically, temperamentally and socially.

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Postoperative Care of Congenital Dislocation of the Hip

Description of a Modified Woo Splint with Case Report

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Edward A. Knight**

Congenital dislocation of the hip requires consideration from three points of view: (1) Diagnosis; (2) Method of Initial Treatment, closed or open reduction; (3) Method of post-operative fixation, plaster of Paris spica or metal brace of type similar to that designed by Woo. The subject of this paper deals only with the third consideration which is common to either form of initial treatment preferred by the particular surgeon.

The method of post-operative fixation for the maintenance of reduction of a congenital dislocation of the hip is particularly important for the following reasons:

The length of time required for maintenance of position by some form of apparatus is of long duration, —six to nine months, Lovett[1]; six to eight months,—Jones[1]; at least one year in all doubtful cases, Whitman[2]; eight to nine months, Sever[3]; while Mercer[4] states that three plaster spicas are used in a period of nine months.

Cleanliness is essential in all patients. Any part of the cutaneous surface of the body which is unexposed to the air and a wash-cloth for a period of nine to fourteen months must be regarded as unhealthy with respect to cleanliness. Particularly is this true in those children where treatment is begun at four to eighteen months of age. At these ages, and in even older children, one cast may not provide fixation for a period of three months. One or more changes may be required because of,—(1) cutaneous irritation, (2) cutaneous ulceration of variable depth, with or without infection as a serious complication, and (3) a broken cast without any degree of cutaneous inflammation.

To avoid such complications by hospital care during so many months is prohibited by the expense involved and, moreover, it is not assurance against their occurrence. The responsibility usually falls upon the mother in the home. The physical effort is great, extra help is expensive and a favorable end-result can never be positively assured. The burden is, therefore, heavy for most families.

In addition to the unremitting care in the home, there is an actual expenditure in cash incident to the use of plaster spicas. With this we are particularly concerned. The authorities referred to admit the necessity of no less than three plaster spicas per patient. This minimum may be safely increased to six in a nine to twelve month period which requires six two-day periods of hospitalization; six stereo roentgenograms before and after change of plaster spicas; and six plaster spicas. This does not include other expenses such as anaesthesia and professional fees.

The Woo splint, Fig. 1, for the maintenance of reduction of a congenitally dislocated hip was designed by Dr. Woo while he was a house-officer at the Bosten Children's Hospital in 1919. Sever[3] states "that the use of plaster of Paris casts have not been conducive to

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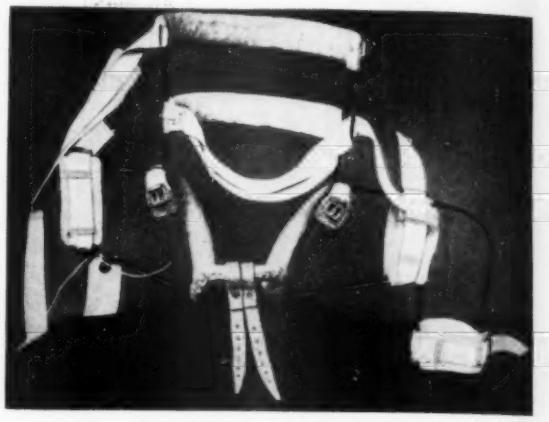

Fig. 1. Wood Splint as illustrated by Sever.

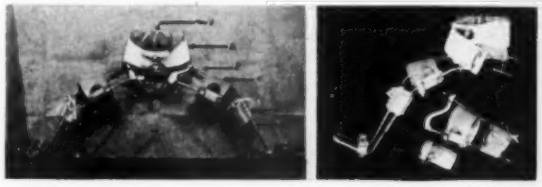

Fig. 2. Anterior view of brace for maintaining position after reduction of congenital dislocation of the hip; ¼" stainless steel rod is used for frame. (1) 5x7, 20 gauge sheet steel covered by calf-skin or rubber envelope. (2) 3½"x25" leather band. (3) 4" sliding joint stabilized by set screws. (4) 3½ x 13" leather cuff. (5) Leather cuff, 4½" wide. (6) 3" sliding joint. (7) Ankle strap, 1⅛"x12". (8) 5" distance. (9) 8" distance. (10) 9¾" distance. (11) Foot support, 5" long, leather covered.

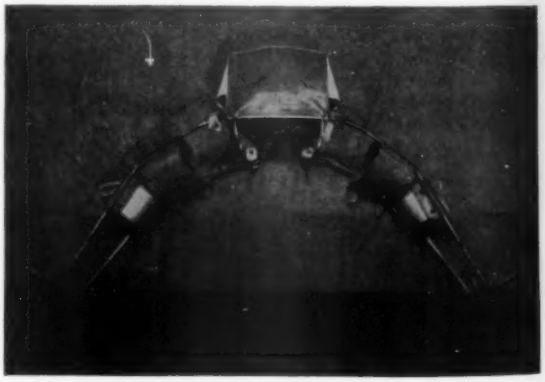

Fig. 3. Metal splint as designed by the authors. (Posterior view).

cleanliness, and require a great deal of care in nursing, as they become wet and dirty, and the children are apt to develop bad sores under the plaster. Now, however, we have a Woo metal splint which can be applied easily to any child, and which obviates the necessity of waiting until the child has reached the age where it can control the bladder and rectum. The splint is measured for and fitted before operation, and it is put on immediately after reduction of the hip while the child is still under ether. In most cases, this method of early operation can be easily used, and assures a more satisfactory end-result at an early age."

The splint as designed was not stable when applied to our patients. Changes were made, therefore, as illustrated in Figs, 2 and 3. The materials used in its construction and the respective dimensions are given under Fig. 2. Sliding joints are provided on both thigh and leg supports. This is essential for changes in length of extremities due to growth. It is also necessary for adjustments required when the hips are brought down to the normal position during the course of treatment. See Fig. 2.

The patient is measured and the splint made and fitted before the admission to the hospital for open or closed reduction of the hip. After reduction the splint is applied and its use has never been accompanied by failure to retain the head of the femur in its proper relationship with the acetabulum.

The splint described will last during the entire period of treatment. The exposure of the skin assures cleanliness; therefore, pressure sores have never developed. All parts predisposed to pressure are well padded. At the termination of treatment the splint is usually in condition good enough for the treatment of another patient. Since such a splint is always returnable to the Orthopedic Shop, it may be used for the benefit of a clinic patient or sold at a lower price for the treatment of a patient from a family of moderate means. The modified Woo Splint first used in 1927 (see case report) has been used again on a patient since June 7, 1932. Complete alteration necessary for the treatment of the second patient cost little more than one plaster spica. It is, therefore, apparent that the use of this apparatus has an important economic relationship to the cost of treating patients for correction of a congenital dislocation of the hip. The cost of this apparatus for two patients is one-third of the total average cost for plaster spicas. The frequency and duration of hospitalization is lessened by one-half, and there is a 50% reduction in the required number of roentgenograms. The cost of treating two patients for the correction of a congenital dislocation of the hip is actually less than the cost of treating one patient when plaster spicas are used for post-operative immobilization.

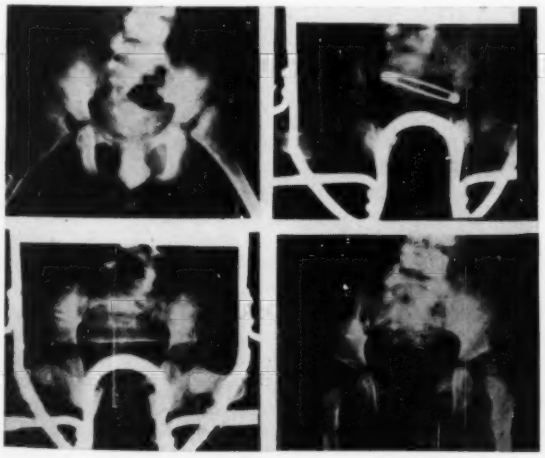

Fig. 4. Case No. 6466, W.I.P., age 2 years. (a) April 2, 1927, bilateral congenital dislocation of hips. (b) March 28, 1928, in metal splint as illustrated in Fig. 2, after shelf operation on left acetabulum. (c) May 26, 1928, after shelf operation on right acetabulum. (d) November 7, 1929, both hips in normal position. (March 29, 1933—Gait is at present normal.)

CASE REPORT

W. I. P., S. M. H., No. 6466, age 2, white male entered the Strong Memorial Hospital, April 2, 1927.

Complaint: Curvature of the spine. Parents had noticed since March 27, 1927, curvature of the spine in the lower back to the left.

Past History: Patient was first seen in Pediatrics OPD, April 2, 1927, with the above complaint, and admission to the house was advised. At birth it was noticed that the toes were clasped in flexion although they could be straightened out. Patient was unable to walk up to time of admission except when pushing a carriage. Patient had measles in 1926 and an attack of asthma two weeks previous to admission.

Family History: Irrelevant except for the fact that the father's sister was "double jointed."

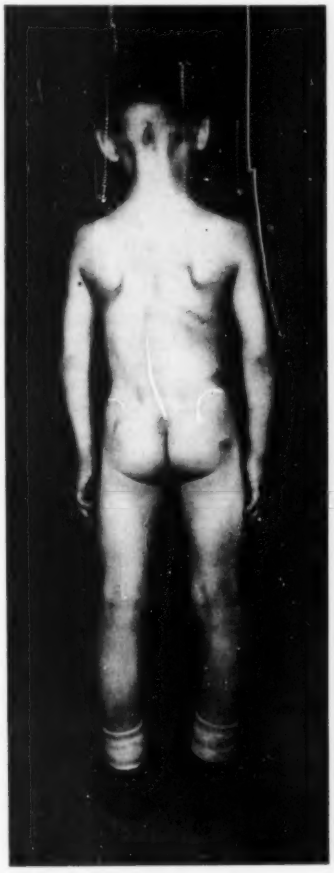

Fig. 5. Posterior view of patient September 8, 1931.

Physical Examination: A well nourished but flabby and pale two year old male. Head large and irregularly square. Throat reddened, and contained considerable mucus. Chest rather "pigeon-shaped," and some "rachitic rosary." Epiphyses somewhat enlarged. Rotation of hips almost 360 degrees. Practically all joints relaxed. The fingers, elbows, knees, hips and ankles slip "out of joint" easily. Wheezing sounds in chest, especially at bases.

Laboratory Findings: RBC. 4.4 M.; HGB. 85%; WBC. 10,000; Urine, stool, tuberculin, Schick, Dick, blood Wassermann, nose and throat cultures—all negative.

Roentgenograms: Showed "S" shaped curvature of spine most marked in lumbar region with rotation of lumbar vertebra to the left. Dislocation of both hip joints

and both shoulders, Fig. 4A. Some peribronchial thickening in hilus regions of both lungs and some increase in mediastinal lymph nodes.

Treatment: On May 27, 1927 dislocation of each hip was reduced by manipulation, and bilateral plaster spica applied from the crests of the ilium to the metatarso-phalangeal joints; femur in 90 degrees abduction; legs at right angles to thighs; feet in varus and at right angles to legs. Subsequent roentgenograms showed both hips in good position and on June 6, 1927, patient was discharged in spica. July 6, 1927, it was necessary to change the plaster spica. July 26, 1927 the broken cast was replaced by a new spica. September 26, 1927 another spica was applied. (Four plaster spicas were used in four months.)

January 6, 1928, a modified Woo Splint was applied which had to be removed because patient developed broncho-pneumonia. Patient recovered and on March 28, 1928, a construction of shelf of the left acetabulum was performed, Fig 4B.

On May 26, 1928, the same was done on the right hip. Convalescence was uneventful. Following both these operations, the hips were maintained in position by the metal splint, Fig. 4C.

September 20, 1928 physical therapy was instituted. Both hip joints were found to be perfectly stable with no tendency to dislocate on abduction, adduction or rotation. Brace was gradually discontinued and by November 7, 1929, the patient was walking normally, Fig. 4D.

Treatment of Congenital Scoliosis: Patient was kept in a posterior plaster shell from November 13, 1929 to February 26, 1930 in an attempt to correct the scoliosis. On the latter date a Hibbs Spinal Fusion was performed from the first lumbar to the first sacral vertebra, following which patient was placed in anterior and posterior shell. Convalescence was uneventful. Roentgenograms on August 30, 1930 showed apparent fusion of the spinous processes of the first and second lumbar vertebra. There was partial fusion between the second and third but a well formed joint between the third and fourth. Stereo of lumbar spine showed marked curvature to the right with rotation of the lumbar vertebra. On June 2, 1931, back seemed perfectly suitable when sitting without jacket. There was slight deviation to the left with minimum of rotation. Jacket was gradually discontinued. Patient was given orthopedic shoes to correct deformities previously noticed, characterized by generalized relaxation of the ligamentous structures of all the joints of the feet.

CONCLUSIONS

1. The best method of post-operative fixation for maintaining reduction of congenital dislocation of the hip should be that which provides the following advantages: (1) Security of reduction; (2) Cleanliness of the patient; (3) Minimum nursing care; (4) Minimum total cost of treatment.

2. The metal splint described fulfills all of these requirements and is, therefore, much superior to plaster spicas for this purpose.

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The Spastic As a Child

Leah C. Thomas and G. Gage Rogers*

FOREWORD

This paper by Miss Thomas and Mrs. Rogers is a direct and competent challenge to all doctors and physical therapists dealing with children with cerebral palsy. Some of the technical methods described can be taken over by interested workers. To this extent technic is involved. A more important matter is that the authors are willing to go beyond technic of physical therapy to thinking in terms of the people involved. Obviously, this is a step ahead and in all probability very few will follow, but it is along the road which will lead to real improvement in the management of these children. *Bronson Crothers, M. D.*

The final argument and one which closes the discussion concerning birth palsy children is this: "After all, these children must live in this world." Do present methods of physical therapy fit the spastic child to live in this world? It seems to us, that viewed from this criterion, the spastic requires a treatment entirely different from other cripples. The large majority of handicapped children have one or more accomplishments which measure up to normal standards. The spastic child can boast of none. The emotion of fear plays too great a part in his life—fear of physical discomfort, fear of falling, fear of being misunderstood. Owing to his inability to cope with physical conditions which surround him on every hand, this emotion is more than justified. He spends his days face to face with difficult situations where fear, nervous strain, and physical exertion are out of proportion to his gains. Chairs, toys, tables, books, playmates are out of tune for him.

His problems are far more difficult than those of the average handicapped child. The crippled child can have a normal world brought to him. The spastic child must have his world adapted to him. In the case of the average cripple attention can be focused on the physical disability with fair assurance that other adjustments will follow automatically. In the case of the spastic these adjustments to life are the most difficult part of the problem. Hence a *life plan*, and *educational program*, and *problems which are vital to inner life and development* are more important than the measured physical improvement that can be brought about.

In many of our present-day clinics, not only is "muscle training" emphasized to the exclusion of all other training but it is carried out under most unfavorable conditions. How many of us can associate muscle training with any other surroundings than a barren buff-colored room in the exact shape of the only piece of furniture to be found therein, namely, a plinth. Into

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this room year after year the spastic is taken to try to relax and try to do certain exercises. If the child were diagnosed as any other type of case than "spastic," a more interesting room would be considered essential.

We believe that the surroundings, conditions, and circumstances which confront these children throughout the day are of equal importance to and, perhaps, more important than the half hour of intensive muscle training. Is there anywhere a situation with all the odds so completely against one as must be met by the eager, ambitious, enthusiastic, yet struggling spastic? Fortunately for many of them, their courage outwits a subtle cruelty which surrounds them.

It is difficult for them to begin to realize at the age of five or six—when their brothers and sisters are starting to school—that they must be left behind. One bright little boy, aged six, when asked by a visitor if he had been to school, replied: "No. I was born this way." When told that his difficulty, which was only of the paraplegic type, would not prevent him from going to school, he said: "No school would take me." He must have heard the matter discussed. This is typical of the conversations these children hear throughout their lives. At six years this boy was convinced, in his case without reason, that he was less capable than other children.

The child who is forced to spend his life in a wheelchair recognizes and accepts his limitations. The family is able to bring to him a happy world and create for him a busy, worthwhile life. The majority of cerebral palsy children, although handicapped in a sense far more than the average crippled child, is constantly "carrying on," is ever bravely launching forth, attempting normal activities only to meet discouragement at every turn.

More important problems than muscle training confront us. After years of muscle training if we succeed in making a patient ambulatory we feel this a triumph. But the spastic child now has to face more embarrassing situations than any other type of cripple. Probably a shuffling gait or a very awkward walk will be his greatest achievement. A boy on crutches or wearing braces tells the world at a glance that he is a cripple. The peculiar gait of the cerebral palsy child is usually taken by the world at large for the gait of a feeble-minded person. If he is able to go to school he is laughed at and frequently shunned by his classmates. To meet this he should be given more rather than less education than the average child. He will need more strength of mind and more courage than the average child. He will need a stronger philosophy of life to be able to hold his own.

To excell in even one field of academic work would help him prove that he is normal, mentally. A thorough knowledge of a subject outside the school curriculum would be one means of attaining this end. If he can feel superior in any way it will help him to overcome an ever threatening feeling of inferiority. We know personally a man with cerebral palsy who is a college graduate and has an M. A. degree. He tells us that he frequently hears unpleasant remarks about himself when in the presence of strangers. It would demand an acquired fortitude of mind and spirit for anyone to live above such daily reminders.

Another point for consideration is that with these children motor coordination is the weakest link in the chain of ideo-motor action, while many of them have normal visual and auditory perception. In such cases education should be directed through these channels. In his "Infancy and Human Growth" Dr. Arnold Gesell says, "The degree of patterned growth which takes place after a vascular injury to the brain is not mainly determined by the motor disability itself, but by innate endowment of the areas of the cerebral cortex unharmed and by the opportunities for the compensatory development of neuroblasts and neurones. There may be extreme and extensive paralysis without mental deficiency. The momentum and the limits of mental growth are apparently determined more by the psychic and symbolic systems than the sensory-motor, whether cortical or subcortical."

RELAXATION

It is a well established fact that conscious relaxation is essential. The child can be taught to let his hands and feet relax lying quietly on the table. Let his hands go to sleep—pretend he is a rag doll—pretend his hands are a mop being shaken. Passive movements to music will bring about relaxation. An intelligent boy of eight years said, "I know what makes me go tight but I can't seem to help it." Another time he said, "I don't want the kids near me when I do my exercises, they make me go tight." He was told to take ten long breaths when he "got tight." He said he tried this in the night and that it helped.

There is another form of relaxation which seems overlooked generally in the care of these children. This relaxation is gained through a feeling of physical security which the normal child already has without conscious effort. This would be one means of maintaining a degree of relaxation and would prevent these children from experiencing frequent situations which cause strain and nervous tension. A normal child, exposed to as frequent periods of nervous tension and fear as these children encounter daily through physical discomfort, would show a marked nervous reaction. We would like to have the normal child set the standard and then adapt physical surroundings to the spastic which will permit him to carry on through the day with no more nervous strain or discomfort than the normal child encounters. This could be attained by adapting this world to him as much as is necessary to prevent frustration of effort, and permit the child to maintain long periods of relaxation.

A marked degree of relaxation is attained and maintained by:

1. Making the child comfortable.
2. Keeping the child happy.
3. Seeing that he is interested.

Some degree of relaxation will be attained by preventing the many difficult or uncomfortable physical situations which confront these children. Conscious efforts of relaxation are of secondary importance. We have seen a child of the tetraplegic type hastily placed on an adult chair and left there to cling with unsteady hands to the back of the chair. The feet were in constant uncontrolled motion which, in short order, the child knew well would cause him an uncomfortable fall to the floor. Many a normal child exposed to an equal amount of nervous and physical strain would be unfitted to attend school that day. Yet this is only one of the many similar situations in which the cerebral palsy child finds himself in the course of every day. For the normal child there is no equal episode unless we consider the emotional strain any one of them would feel if suddenly, without warning, he were flung to the top of a flag pole and told to remain there until someone chose to take him down.

A normal child or a child with infantile paralysis knows when he is placed on a table or in a chair that he is not going to fall. The spastic child knows from experience that he is going to fall. There is tremendous

emotional strain and tension on the part of these children as they cling and clutch to adults, making desperate attempts to tell us not to go away and leave them there. We would not for a moment put a normal child under such strains and tensions as many spastics are forced to endure every day for years. A little adjustment of the physical surroundings and more thoughtfulness on the part of the attendant would lessen nervous tension and speed effective muscle training. It is time well spent to assist the child to a chair and allow him to sit down at his own rate of speed rather than that of the assistant. Ask the child if he is all right before taking for granted that he should be, and dashing off to the next duty. Frequently these children are placed upon a high table. Although they do not fall they fear they will, and great emotional disturbance results. The sum total of this fear emotion must play a large part in preventing these children from relaxing.

If we can take away this element of fear which rises to a high pitch many times a day because of difficult situations we believe that much emotional nervous strain may be prevented and a greater degree of relaxation be maintained over long periods. This can be accomplished, but only by the incessant thoughtfulness of those caring for those children.

CONCRETE SUGGESTIONS

If instead of being placed on a slippery kindergarten chair with his feet dangling, the child is put in a well-fitting arm chair with feet firmly on the floor, he can give his entire attention to something else. If he is sitting at a table where every overflow movement causes his hands or fingers to hit the edge of the table, he cannot relax. If he is trying to draw or write or use crayons and has to struggle with the problem of holding the paper steady (in which he will not succeed), must not this added effort be one cause for the lack of concentration which seems to be typical of these children? The situation is analogous to trying to write on a railroad train in our early years when numbers and letters were written only with difficulty and uncertainty. A few thumb tacks to fasten the paper to the table would give the child a better chance of keeping his attention on the constructive work he is trying to do.

We do not feel that these children must learn to adjust themselves through hard knocks and physical discomfort. We have become convinced rather, that attempts at constructive work, both academic and in muscle training, are more successful if all the necessary accessory physical adjustments are made before the constructive work is begun. We believe there is therapeutic value in making sufficient adjustments of this sort to give them a feeling of relaxation and security.

Eventually many of these children will learn to sit in kindergarten chairs, to work at tables, and to write without having their papers pinned down. But until they can do this without unreasonable frustration of effort, nothing is gained and something is lost in forcing them to undergo unnecessary and confusing nervous and physical strains, which may frustrate the attainment of the end sought.

Unless those who care for these handicapped children are thoughtful about the meal hour, a situation of nervous strain from too rapid eating is created three times a day. This situation frequently assumes proportions of strain under which it would be impossible for a normal child to continue his meal. Few of these children should be expected to eat in the same length of time as that of normal children. At best the spastic child must concentrate and make a business of eating. Unless this situation is appreciated he is made conscious that in spite of his earnest attempts and concentrated efforts the family is leaving him behind, and the necessary slowness of his eating pace will distress and discourage him. The unconscious type of relaxation which is our goal may be maintained if the child learns to have confidence in those caring for him. To give these children their best opportunity to develop mentally and physically we must remove the stumbling blocks which threaten every inch of their way. We must average for them a world in which the accessory obstacles to be overcome do not differ in degree, though they may in kind, from those which a normal child may be expected to overcome without unduly disturbing his power to concentrate upon the end sought. This will require:

1. A sense of security at all times.
2. Giving the child with speech defects time enough to express himself without being conscious of the impatience so frequently shown by adults.
3. Giving time enough to allow him to go through the daily activities of the normal child at a slower rate of speed than normal children.

MUSCLE TRAINING

With understanding, thoughtfulness, and patience we believe that muscle training can be carried on throughout the day without fatigue. These daily activities and interests from an early age should measure up to and balance in the child's mind the interests of his normal brothers and sisters.

Our first duty is to make all muscle training exercises enjoyable, to give stimulus by demonstrating to the child that he is succeeding and never allowing him to become discouraged. A child rarely wants to try a second time if he has failed completely the first time. We must remember that these exercises are not a matter of months or even a few years but may be necessary for ten or twelve years to come. Many of these children's lives are burdened by thoughtless directions from adult members of his family. If these continue, sooner or later the child secretly realizes that no matter how earnestly he tries, the returns for his efforts leave him far behind his hopes, and still farther behind the expectations of his family.

There is a real reward if the exercises have given pleasure. Through the stimulus of play such a child is able to make many motions far more accurately than when trying to make the same motions under the directed effort of a task. The peg board is an excellent example. Some children, under direction, will make tremendous mental and physical effort to pull these pegs out of their holes. These same children, playing together, will reach an arm forward and send a balloon merrily on its way to another player in the circle.

Children who are unable to use their hands—and are discouraged trying—will attempt with fair success, in a group, to play "Simon Says." Arm swinging in rhythm to music will be more enjoyable if the child makes patterns with a colored scarf or holds strips of crepe paper.

Children who cannot clap their hands together when trying under direct command will play accurately the cymbals in a rhythm band. Tie bells to the wrist of a child who cannot hold them in his hands and he becomes a successful member of the band. Children not able to control arms or hands may, either sitting or standing,

mark time with feet or head. We believe there is therapeutic value in a rhythm band for these children.

Nothing thrills and excites one of these children more than the first two or three times he tries to walk. But soon the actual business of walking and practising to improve the gait becomes a chore rather than a pleasure. A lazy, heavy boy of ten tired very quickly when put on his feet. He had never walked but all his life had crawled on hands and knees dragging his feet crossed behind him. After an operation he was ready to be taught to walk. Put in the hospital walker—a device made of two long strips of iron tubing—he would take a few steps and then say he was too tired. At that point another little boy, who also was learning to walk, was put in the walker with the first boy. All thought of weariness was gone and with great laughter they played tag. For the first time in their lives they were playing tag, a game which they had seen played in their neighborhoods at home by boys and girls they knew. New interest was added to the game the following day by calling it "Cat and Mouse." These two children had more exercises in the fifteen or twenty minutes that they played together than one child alone could have had in an hour taking his exercises without the stimulus of play.

Endless fun can be had in a group of three to six or seven children who are learning to walk. The boy who stands in the walker pretends to be the man who owns an imaginary drug store. A table with real unbreakable cups on it placed in front of him brings more smiles than any soda fountain ever did to the face of a normal child. The remaining children are eager to walk across the room to buy an ice cream soda. As the technician is helping each one on his way, a discussion of the cost of the soda goes on. Consult the store man about his price and finally agree upon the actual cost in regular stores, and pay for it in cardboard money. Talk about the flavors and about the arrangement of merchandise in the store. Other purchases in this same store may be considered. The children will be so diverted they will be quite unconscious of making any effort in walking. The fact that each child must wait his turn and be assisted in walking seems to be completely overlooked. Shopping trips across the room are made in the same manner. We make and sell bus tickets and collect fares. Actual money may be used and the first lessons in arithmetic could easily be made practical at this point. The well-known game of hiding an object while one person goes out of the room is especially appropriate for this group. The technician assists each child in turn in walking out of the room and in walking around the room while searching for the object. Not one child in the group is conscious of the walking difficulties of the other children. It is interesting to see that this game goes on with exactly the same group cooperation as with normal children. We believe that greater progress in walking will be made through indirect methods of muscle training than with formal exercises and conscious effort on the part of the child.

CONCLUSIONS

1. Because of the nature of the handicap of children with cerebral palsy their problems are more difficult to overcome and their chances of success are less than those of other crippled children. From birth they have less chance for mental, physical and social adjustment to their handicap than the average cripple.

2. Through their first fifteen years, emphasis on the educational side and social adjustment will fit them to meet situations of adult life far better than making physical accomplishments their outstanding goal.

3. The secret of success in their education and muscle training lies in the stimulus of succeeding. Because of the nature of their handicap they should be rescued from situations which bring about frustration of effort and inevitably lead to discouragement.

Functional Neuroses Following Injury

W. H. Hengstler, M. D.*

Among the many problems confronting physicians at the present time, particularly those practicing in the field of neuropsychiatry, is that of treatment and rehabilitation of individuals suffering from functional nervous disorders following physical injury. The increasing use of the automobile, with its consequent traffic hazards, has resulted in tremendous increase of accidental injuries, and in the nervous and emotional manifestations following such injuries. Twenty-five years ago, the so-called tramautic neurosis was comparatively rare and was limited largely to individuals who had been injured on railroads—either employees or passengers. With the advent of compensation insurance and the automobile, however, there has been such a marked increase in personal injuries and claims attached thereto that, at the present time, the functional nervous disorder secondary to physical injury is very common.

In contemplating this subject, as in the case of any medical problem, it is well to begin by considering just what the condition is and in just what manner it arises. A functional nervous disorder may be defined as a disorder of the emotional system, wholly psychic in origin, characterized by a large group of subjective symptoms, few objective symptoms, and by changes in personality which have no organic foundation, as far as structural injury to the body is concerned. It may be stated, to begin with, that there need be no direct relationship between the severity of the physical injury which a person sustains and the severity of the nervous and emotional reaction following it. A very slight physical injury may result in a very serious emotional disorder, and likewise a very serious physical injury may be sustained with no particular emotional disorder following it. Herein enters the personal equation, and the amount of emotional reaction an individual has following an injury depends largely upon the personality pattern and upon his ability to adjust himself to the fact that he has sustained an injury, and to the pain and discomfort which naturally follow it. There is no law or rule which measures an individual's susceptibility to the emotional after-effects of trauma, and there is no rule that determines just how much trauma is neces-

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sary to produce in a given individual a so-called traumatic neurosis. The mechanism by which this neurosis arises is entirely psychic. Its basis is fear. The psychic distress and fear engendered in the mind of an individual by a very trivial accident are frequently sufficient to produce long and troublesome disabilities, due to emotional disorder. Theoretically at least, when an accident occurs, an individual should have a more powerful emotional reaction following it if there has been momentary knowledge of the fact that an accident is going to happen. In other words, assuming that we are dealing with an automobile accident, if the individual realizes for just an instant prior to the crash that there is going to be an accident, and sees even momentarily the impending crash, there is laid the foundation of fear which is entirely missed if the accident occurs as a surprise. The person having this experience is much more apt to develop a severe emotional reaction following the physical trauma sustained in the accident than an individual who is injured completely by surprise. Peculiarly enough, it is not always the person of neurotic temperament who suffers the most severe neurosis following injury. Oftentimes an individual of phlegmatic type becomes completely disordered so that psychic control is lost and a very severe neurosis results.

Functional nervous disorders following injury are characterized by a large variety of symptoms, both subjective and objective, but with subjective symptoms decidedly predominating. These symptoms have their origin in the psychic field and do not necessarily bear direct relationship to that part of the body which was injured. Where there has been concussion of the brain there are particularly apt to be symptoms referable to the head. It must be borne in mind that concussion of the brain is that condition arising as a result of a blow to the head in which consciousness is disturbed. Concussion does not imply structural injury to the brain, nor fracture of the skull. It must likewise be borne in mind that there may be an extensive skull fracture without brain injury, and that there may be a severe brain injury without skull fracture. In the mind of the layman, fracture of the skull has always had very profound significance. He has always associated skull fracture with brain injury, and the knowledge that he has sustained a skull fracture makes a very profound impression upon him and immediately arouses in him fear and apprehension concerning what may have happened inside the skull. Experience has shown us, however, that a simple uncomplicated skull fracture does not differ materially from the fracture of any other bone in so far as danger and healing are concerned.

The outstanding characteristic of the symptoms of a traumatic neurosis is the fact that they are largely subjective and that they do not conform to the pattern of organic nervous system injury. Predominant among the subjective symptoms are pain, dizziness, sensory disturbances, loss of sleep, loss of appetite, more or less depression and marked anxiety. Pain, when it occurs, is frequently vague and intangible and is described by the patient as shooting pain or pain simulating pressure or lancinating pain, and often as pain which goes over the entire body. This pain follows no particular anatomical distribution of nerve supply. It frequently changes from one part of the body to another with lightning rapidity and comes and goes at various times, depending upon the emotional state of the individual. Dizziness, when it occurs, is always purely subjective in character, and is never substantiated by objective findings. It may occur in spells of momentary duration or in long periods, as for an entire day or two at a time. Periods of depression are frequently characterized by crying spells and other emotional exhibitions in which the individual loses self-control and permits his fears to express themselves in this manner. Loss of sleep and loss of appetite induce nutritional disturbance and result in loss of weight and generalized weakness. Anxiety is always an outstanding characteristic of the functional nervous disorder. It may take the form of anxiety concerning the injuries themselves, or frequently it may center around the possibility of recovery. Not infrequently is met the fear of insanity. This has its origin in the fact that the patient recognizes his inability to control himself and to concentrate normally, and he instinctively feels that he must be losing his mind. Anxiety produces restlessness and results often in marked exhibitions on the part of the patient, such as twitchings, jerkings and general maladaptation and discomfort. The common objective symptoms associated with the functional nervous disorder are the very evident depression and morbid attitude of the patient, frequent twitchings and jerkings of different kinds affecting one or more parts of the body, and often hysterical paralyses or hysterical convulsions. Hysteria may be defined as the conversion of an idea into a physical manifestation. In cases of accident, where the idea of injury has been implanted in the mind of the individual, there often occurs this conversion of the idea into a physical manifestation resulting in loss of function of one or more limbs, possibly convulsive seizures, and even blindness or deafness.

The symptoms of the neuroses which follow injury may be widely variable and do not conform to any particular fixed pattern. They vary according to the circumstances surrounding the injury, the type of personality of the individual who is hurt, and the parts of the body which are injured. The chief general characteristic of these symptoms is the fact that usually they are not anatomically compatible with actual physical injury. These symptoms of a neurosis vary in severity from those which produce only relatively small discomfort to those which are actually disabling. A neurosis may exist without disabling the patient, particularly when loss of sleep is not predominant. In cases, however, where loss of sleep is predominant, anxiety is always increased and power of concentration impaired until the point is reached where the individual can no longer successfully maintain his occupation or social relationships, and he becomes truly disabled. In judging disability in cases of this kind the opinion must be based largely upon the objective symptoms which present themselves, such as nutritional disorders, loss in weight, intense restlessness and emotional distress and evidences of loss of sleep, and inability to exercise self-control.

The diagnosis of a functional nervous disorder should be the last diagnosis made. It is reached only after very careful examinations have ruled out all possibility of organic or structural injury. In justice to the patient, judgment must be used in arriving at the conclusion that the disability is functional and not organic. The true functional neurosis must be differentiated from the compensation neurosis and from malingering. Malingering is the deliberate attempt on the part of the individual to secure compensation for something which does not exist. A compensation neurosis is an emotional disorder in which anxiety on the part of the patient centers around receiving payment for injuries, rather than upon recovery. The true traumatic

neurosis portrays anxiety centering primarily around self and symptoms and upon chances for recovery, with compensation an important factor, but not occupying the center of the stage.

The treatment of the true functional neurosis or so-called traumatic neurosis, which is severe enough to be disabling, must be conducted along very definite lines in order to secure best results. The first and most important step in laying the foundation for recovery is a settlement of claims for damages, and disposition of any lawsuits which are pending. The effect of unsettled claims for damages or of litigation which is pending is inevitably disorganizing to the individual, and recovery in these cases is practically impossible until this particular part of the atmosphere has been cleared. The earlier a settlement is reached, the quicker recovery starts. This reaction of impediment to recovery by unsettled claims is entirely subconscious on the part of the affected individual. He does not willfully prolong his symptoms, but subconsciously they are kept active in the foreground of his mind, by the necessity of remembering them to present to the court and jury, when he is on the witness stand, and by the fear of going into court and facing cross examination. In the life of the ordinary individual nothing is more unusual than to engage in litigation and be subject to cross examination on the witness stand. The thought of facing this is always detrimental to the morale of the person who is suffering from a real neurosis, and it is the duty of the attending physician, in cases of this kind, to insist upon a settlement of claims for damages at the earliest possible moment.

The second requisite to insure speedy recovery is to remove the patient from his home and normal environment into a hospital or sanitarium, where he can be given a carefully organized reconstructive program. Rest in bed for a short time after reaching the hospital, with exclusion of relatives and friends and mail and telephone calls, is advised. Sedatives, as necessary, to produce relaxation, and medications to produce sufficient sleep are desirable, with a supernourishing diet in order to improve the physical side as much as possible. Hydrotherapy, in the form of packs and baths for sedative purposes, is always useful. Bed rest is employed until such time as relaxation is complete, and then the individual is got out of bed gradually on an increasing scale, activity at first being confined strictly to sitting up in a chair in the room. When a maximum sitting up time of five or six hours a day is reached, it is permissible to begin dressing and walking, on a gradually increasing scale.

The part played by physical therapy in the reconstructive care of individuals suffering from neuroses following injury is highly important. It must be borne in mind that in the majority of cases the physical therapy serves a psychic purpose rather than an actual physical purpose. General massage, of course, in individuals who are depleted and undernourished, is given from a standpoint of improving the physical condition. Heat treatments are employed and are useful in cases where pain and other discomfort is confined to a certain area of the body where injury has been received. Where complaints center around the back or around joints or around the neck or extremities, ordinary therapeutic lamp treatments are desirable and are found highly effective. Educational exercises, particularly where there is disturbance of co-ordination in either upper or lower extremities, are very valuable. Here it must be borne in mind that the value is psychic and not physical. Teaching the individual to make purposeful movements, re-education in walking or in the use of upper extremities which have been disabled from a functional cause, is extremely important and very valuable in promoting return to health of these individuals. The electric current is used in its various forms, in a large number of cases, with great success. Here, again, it must be borne in mind that the use of the electric current serves a psychic purpose. Whether it is used in the form of high frequency or whether the galvanic or faradic currents are used, or whether diathermy is employed, its purpose is psychic. Local packs to various portions of the body, local massage and rubbing, and local application of vibrators and electric currents are frequently found to be very useful.

The relationship of the physical therapist to the patient, in cases of this kind, is largely that of instructor to pupil. The attitude of the physical therapist must be one of optimism and common sense. The value of physical therapy to these cases is in its regular administration. A definite schedule should be followed, with the various types of physical therapy that are being used on the individual case applied daily, or three times a week, for the same length of time on each occasion, and with unbroken regularity. The importance to the patient of physical therapeutic treatment in functional neuroses is not primarily the physical benefit that they obtain from it, but is the psychological relief which is accorded them by knowing that definite treatment is being employed to that part of their body which causes them pain and discomfort.

Physical therapy should always be employed in this group of cases, under the direction of the attending physician. The type of physical therapy to be employed, the frequency of the treatments and the length of time that the treatments are to last should be governed by the attending physician. The physical therapist should at all times work under the direction of, and co-operate to the fullest extent with the doctor who is in charge of the case. Psychic re-education and the dissemination of acquired fears by properly applied physical therapy are vitally important in the rehabilitation of the functional nervous case which follows injury.

The Human Factor in the Treatment of Patients

Lucy G. Marshall*

Our success in treating patients depends upon our ability to establish as quickly as possible a feeling of courage and faith that the cooperation between the Physiotherapist and the patient will bring about the desired results—return to a working capacity. Methods necessarily vary with individuals and, as the end result is all that matters, there can never be one accepted method.

However, in hopes that the plan with which I do my work may be of help, I will try to set down the factors which seem important to me and make it possible to establish an atmosphere in which patients will most readily get back the necessary morale, and into the swing of transition from sickness, handicap and discouragement to health and normal living.

Advantages and Disadvantages of Clinic and Private Care

We have long recognized the assets of clinics—in which a friendly spirit and interchange of experiences and enthusiasms among patients waiting for treatment, work most usually for a feeling of confidence in the patient toward their treatment and the people who are helping them along the road to recovery.

The advantage in private practice of having the time and opportunity to become closely acquainted with the personality, occupation and avocation of the patient makes it posible to work out more understanding and efficient methods of treatment which are of interest to the particular individual and his recovery.

The great disadvantage in clinics has always been in the fact that large numbers have to be treated and one must, to a large degree, use routine methods of treatment for type cases. Often we find it necessary to have much of the work done by students under the direction of trained workers, and for them we must lay down certain principles and rules to be followed. The result is that we find Jim Jones, truck driver; Mary Smith, factory worker; Annie Brown, aged scrub woman now a city charge, and Fred Boyle, time checker, all, we may say, with a subdeltoid bursitis,—having exactly the same routine treatment and exercises, with no regard for temperament, occupation or interest in life.

In private practice each of these people would be considered as an individual and separate case, not as Subdeltoid Bursitis, Case No. 9436. We would give consideration to the interests of the patient, his occupation and the motions involved. Then we would plan our treatment at the office, and for him to carry on at home on that basis.

The advantages and disadvantages of both types of treatment being brought sharply into focus, and being most fortunate in my association with a doctor who heartily approved of the ideas, the following method of treatment of private cases has gradually developed. Like many children, it has suffered at times from growing-pains, and we have learned by trial and error, and have much to learn in the future. However, in the last five years this plan has developed to a fairly smooth working system, is in good working order and getting results in a way which is simple and expedient.

Office Equipment

My office is a fair sized room which may be subdivided at a moment's notice into three small rooms by the use of curtains, or left as one large room, as the occasion demands. In this way it is possible to control the degree of privacy necessary to the case, and at the same time be in close contact with all that is going on. Two bed-sized treatment tables with removable mattresses, two tables for arm cases, stall bars, bakers and heating elements, Morton Smart Unit, the usual Indian clubs, wands, rubber balls, ropes and pulleys, toys, kit of tools, and many small articles for use in exercises too numerous to mention, comprise the equipment.

The apparatus, as is readily seen, has been kept extremely simple. The patient must feel that we can show him what he can do at home, not that he comes to the office for all of his care. He comes to the office for that part of his treatment which *must* be given by a skilled physical therapist who gives instruction and guidance in his home care. Under these geographical conditions it is possible to carry on the treatment of two or three people at the same time.

Types of Patients and Cases

The patients come from all walks of life and the types of cases run a long list of many and varied diagnoses as are referred to a consulting surgeon. Many times these patients are being sent to a last court of appeal and are second and third hand cases.

The family doctor being able to care for the routine cases, the simple cases are few in proportion and most of the cases are therefore difficult in one way or another.

Attitude Toward Patients

When a patient is presented for the first time for treatment, it is imperative to size up in a general way the personality and attitude of the individual toward his particular condition and life in general. The questions brought to mind are "with which patients will he receive the greatest impulse toward recovery? Who is there, having had a similar injury and been 'down in the dumps' is well on the road to recovery with confidence and cheer? What type of person will this new patient enjoy talking with? What can he give to others?"

Of course, first judgments are not always correct, but it is easy to change appointments and contacts as fits the case. One must use tact. Some patients must be warmed up to a situation of meeting other patients in a seemingly casual manner. Others are brought in on their first treatment and introduced to the other patients just as if they were guests in your own home.

The patients are not aware of the psychology involved, and only a few ever reason it out for themselves

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and then only when they have almost completed their treatment. One fine gentleman, a highly skilled toolmaker, discovering the system, said one day, "You know, the first time or two I came here, it seemed queer. I had never been to a doctor's office where patients spoke to each other, but after a few visits I felt at home and looked forward to future visits. I like it."

INDUSTRIAL CASES

The average workman is a pretty good sort of person who is used to hard knocks and takes what comes along from day to day as a part of the routine of life. When he is injured, if he is sent to a hospital, he is put into a ward where he finds an easy going atmosphere among his roommates, some getting up and getting ready to go home who encourage the others, perhaps a crabby individual who is either jollied out of his crankiness or left alone. A ward rarely fails to have at least one patient who has courage and good nature, a joy forever to the doctors and nurses in charge, because here we find the keynote to a high morale. In twenty-four hours our new patient feels at home.

When he leaves the hospital and its routine to return home and report to the doctor's office for further treatment, he usually meets with a different situation. To begin with, he is usually warned about getting back on the job, wondering how long it will be, if he has a family as to how long they can live on his compensation, and if he will be able to do his job well enough to hold it once he is back at work. All this is going on in his mind as he waits in a strange reception room with people of all walks of life, waiting his turn—and wondering.

After the examination by the doctor he is turned over to the physical therapist with instructions for treatment. According to the generally accepted plan, the patient would be taken to a room, some form of heat applied, massage and instructions for home care and exercises given.

How much thought has the physiotherapist given to the fact that this is all very new and strange to the patient? How do we make him feel that he is not a case but an individual. Do we have the time and opportunity to make him feel, that first time we see him, that he is among friends and that a personal interest is being taken in him? Does he look forward to his return visit? The man misses the friendly intercourse of the hospital and usually feels lonesome, for he now has no necessary routine of living.

Contrast with this the method of taking this man to a room where he finds two or three other patients in the process of treatment. He is introduced. He finds that everyone is having a pleasant time. This may not be such a bad place after all, for the others seem to be at home and having a good time. So, while he is in the process of treatment he sees what happens to these other patients and how they take their exercises, hears them tell what they have accomplished since their last visit, and what new things they can do. His mind is all made up to do his best when his turn comes. The informality has great advantage.

Men of the same or allied trades find much in common. Half the battle is won when a roofer finds a fellow roofer, an electrician or a worker in any of the building trades who is already comfortably initiated into the routine of getting himself ready to return to work. After friendly introduction to one or two patients who are having treatment, I often deliberately leave the room for a few minutes. On my return, invariably the men are checking up on where and for what concern they work and Mr. Jones, with much pride, announces that he put the roof on such a building and his neighbor answers "Oh, did you! I know Fred Smith who worked on that job. Mr. So and So is a good boss to work for," etc. Now the new patient finds that he has met someone who talks his language.

Unless one has been in close contact with industrial cases one does not appreciate the fact that the average man on the job, having more or less skill in his particular line, considers his type of work the best, is clannish to a high degree, and proud of his work. This is not at all evident on the surface to a casual observer, but just show a slight interest in the type of occupation that your man is engaged in, ask a leading question with a genuine interest and your seemingly stolid or indifferent workman becomes an individual. He likes his job and knows that he can do it well. Woe to the uninitiated who thinks that an electrician who may be handicapped for return to his own trade can be talked into training for another trade. It cannot be done. The man belongs to his Clan. He will do anything in his own line, but nothing in any other. Not that he might not be more easily trained and could become more skillful in other trades, but the mental processes do not work that way, and it is back to work on his own job or nothing, as far as he is concerned. These facts are so often overlooked that a man is unfairly judged, uncooperative, and thought to be chiselling the insurance company, when his whole interest is gone without his old job.

PROFESSIONAL MAN

The professional man and his reaction to this type of treatment is most interesting. If he has been in the hospital, he has been in a private room surrounded with more or less luxury—a telephone, flowers, friends dropping in at all times during the day. In other words, he has been the center of the stage. If he has been at home, the same holds true. The world of his home has revolved around him. By the time he arrives for office treatment he is more or less in the stage of feeling that his injury or condition is very serious and should be so taken by all concerned. After being introduced to the other patients having treatment, he usually, for the first and perhaps the second treatment, reminds one very much of the only child on his first day of school, wanting to be a part of the busy class but wanting at the same time to continue to be the one and only in the attention of the teacher. One can easily in such favorable surroundings, without apparent effort, make the transition painless. The patient finds with surprise that he is taking himself much too seriously, and that after all he is only one of a multitude who has gone through the same ordeal and returned to work. By the third treatment this patient is comparing notes and chatting happily with his fellow patients. Many times these men get an insight into the attitudes of the industrial classes which is most valuable to them in their work.

I recall particularly a clergyman who requested that he remain incognito and said that he had not enjoyed anything as much since his student days as he had the friendly comradeship and exchange of ideas while having his treatments. For a brief recess in his busy life he was not "the minister" but just a middle aged man with a broken wrist.

Also, the case of a very successful lawyer comes to my mind. Used to direct cross examination, making

everyone with whom he talked answer "yes, sir" or "no, sir" and perhaps stand in awe of him, the stage was set with a longshoreman of the older type (Irish) with a similar injury, and a boy of twelve, with Volkman's paralysis.

The lawyer liked boys. He was drawn out of himself in his interest in the plucky lad who was always going to have a handicap, and he was buoyed up and carried along by the philosophical attitude of the longshoreman who had had plenty of hard knocks in his day and knew that with good care he would be back on the job in a reasonable length of time, and that it was all in a day's work. With no effort on my part except to pick the right people to surround the lawyer, his whole attitude was changed. He looked forward to his treatments and return of function, so that in a short time he was a booster instead of the boosted. Under purely private case treatment this man would have remained morose, disgruntled with fate and the world in general. He certainly would not have had the spirit to work hard for an early recovery. He says that his experiences in meeting and knowing the people he met while under treatment has changed his attitude toward and improved his understanding of many types of working men with whom he would never under other circumstances have been able to meet on common ground.

BUSINESS WOMAN

The average business woman is used to meeting many people in the course of a day. She misses the contacts of business life and feels shut off from things that are going on. Coming for her treatments and meeting other patients somewhat approximates the varied activities and personalities of the business life.

It is an easy step then to the transitory routine which gets one back to the job again. The business woman is used to working with both men and women and by selection of patients it works well to carry them along together.

HOUSEWIFE

The busy housewife and mother bring another type for our consideration. Many of these women went to business before they were married and are interested in work similar to that in which they had been engaged. They enjoy seeing new people and certainly give to the other patients much in the way of courage.

The homemaker must continue as much of her daily routine as is possible for her to do and is usually ingenious in her methods for getting things done. "Necessity," to quote an old saying, "is the mother of invention." What a good example for the person who thinks that he can not do anything for himself or others!

SCHOOL CHILDREN

Along comes the boy or girl with a fracture. The average child is so anxious to play that the necessary procedure is one of limiting activities. The willingness of the child to exercise is an eye opener to the apprehensive adult.

The timid child is immediately reassured by the sight of many people happily going through their routine treatment. By the time it is his turn, interest has taken the place of fear and the initiated spur him on with their confidence and enthusiasm.

Most adults enjoy children and down to the tiniest child who reports for treatment, cheer and a friendly attitude make the child feel that the physical handicaps, whether they are temporary or permanent, are just a part of life. Often the family of the child has so dramatized his situation at home that informal treatment is the only method of clearing up the disastrous effects of a worried family.

On the other hand, I frequently see men and women so anxious to have little Johnny or Mary work hard at their exercises that they put forth more effort on their own behalf than otherwise would be the case.

THE POISONOUS CASE

Perhaps this classification may seem odd, but, just as some foods may cause ptomaine poisoning, some patients have a similar effect on others and we have come to label them poison which seems to aptly describe their effect on patients with whom they come in contact.

Occasionally we all have one of these people whose attitude toward return to work is not good and never will be, who continuously grouches and grumbles about the insurance company, the one responsible for his accident, the lawyer who has his case, or the person he is suing. Put him in the place where it is impossible for him to do harm. Let him have his treatment along with one or two others who are satisfied and whose opinions are not easily shaken.

Never let two chronic fussers get together to compare notes, nor let them have a receptive audience, and their poison which might under favorable circumstances start havoc is rendered ineffective just because it is not taken seriously. I might add here that it is well with compensation cases of this type to let the insurance company know that you are handling the patient just this way.

A laborer of this type came to me from the insurance company. He was a six footer from the north of Italy, well built, well nourished, indolent, and with the knowledge that his constant complaint of a pain in his back when he did any work, brought in enough compensation for him to sit around and take life easy. He had found out that no one could prove beyond a doubt that he did not have anything the matter with him as long as he fussed and cried about his back every time he moved. We all had our grave doubts as to his pain.

The stage was set with a high type of Italian young man who was having a forcible flexion of the knee, a boy of twelve with a Colles fracture, and an older man with an arm involvement. All I had to do was put him through exercises and let the others comment to him when he fussed. It was all done in such a good natured way that the man could not be provoked. One day he discovered that he was doing motions in his exercises that he had claimed to the doctors were impossible to do. He immediately clutched at his back and with tears in his eyes and voice begged "Please, Miss Marshall, don't make me do any more, it kill me." Then from the man with the knee, a barrage of Italian was delivered. I shall never know just what was said, but I have a fairly good idea because the acute symptoms disappeared and in a week or two this man was discharged from the physical therapy department. Could this have been accomplished by any other method? I doubt it.

EXCEPTIONAL CASES

All this does not mean that we never find patients who should be treated alone and with the usually accepted method of caring for private cases. Occasionally, by

temperament, a patient does not wish to mingle with others. There are those whose personalities would not be an asset or would not be understood by a group having treatment. If a patient can not gain or give help by his presence in a group, he should be treated by himself.

It seems rather surprising in the course of a year how very few there are who fall into this class. One wonders that there are not more. Man is by nature gregarious. Perhaps that may be the reason. Fortunately the large proportion of patients are easily adjusted to surroundings which make for a friendly cooperative spirit where all are doing their best to get well.

CONCLUSIONS

Perhaps the proof of the success of this method of treating patients may be expressed in the conversation and attitude of the patients themselves in the waiting room. It does seem rather stupid that people should sit waiting to see the doctor or to have treatment, each apparently reading, or engrossed in his own thoughts—secretly concerned and very likely worried.

Here patients come in who have met during their treatment. They speak, talk together, perhaps draw into conversation a neighbor. Patients may be pasting pictures into a scrap book, exercising their hands and arms and at the same time making something for other patients to enjoy. The waiting room becomes transformed—it is now a gathering of people in a friendly state of mind. Patients say that they always feel among friends when coming to the office and look forward to their visits.

When one hears "How is your arm?" "Going to get the cast off today?" "Then you will be able to join our Club. When you get in there you are on the last lap of the race and you will be all right soon," then we know that the method of treatment has reached its goal and another patient is master of his situation.

Physiological Rest and the Preservation of Locomotion

Vernon L. Hart, M. D., F. A. C. S.*

The fundamental and guiding principles of the prevention of deformity and the preservation of function of the apparatus of locomotion should interest both the general practitioner and the specialist. The orthopedic surgeon is primarily concerned with the correction of deformities and the restoration of function of the apparatus of locomotion, and, as a teacher, he instructs his students in the underlying mechanical and physiological principles which will prevent deformity and disability. The orthopedist has little opportunity to apply practically these principles as compared with the other members of the medical profession. However, he is more cognizant of their meaning and importance since too frequently he sees the crippling conditions which result from a lack of understanding and improper application of them. These principles were not emphasized to the medical student twenty years ago. Today they receive some emphasis and their application prevents many surgical hazards and gives much gratification. The field for their use is large and they are effectively applied as a part of the therapy for any disease or condition which may possibly terminate with partial or complete loss of the functions of the extremities and the spine. Paralyses, burns, nutritional disorders, bone infections, joint infections, injuries (to nerves, tendons, ligaments, bones, joints, and muscles), the arthritides, congenial deformities and other less common problems may often require the intelligent use of the principles to be considered in this paper.

Collectively the principles may be termed as "physiological rest." The principles of rest have been studied and practiced since the time of John Hunter (1728-1793). Sir Arthur Keith states in *Menders of the Maimed* that "it was the custom of John Hunter to prescribe 'rest' as a routine measure in the treatment of disablements of the motor system of the human body. John Hilton (1807-1878) regarded rest as the most powerful aid which the surgeon could bring to the aid of disordered tissues and Hugh Owen Thomas (1834-1891) made rest his creed and ritual." Rest as a part of the therapy for disorders of the apparatus of locomotion is at present too often neglected because of insufficient knowledge of its meaning. In general the conception of the term "physiological rest" is incomplete and confused. The program of physiological rest will vary according to the particular disorder but the underlying principles expressed in the following general outline are constant. The principles are mechanical and physiological; the therapy is applied anatomy and physiology.

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PHYSIOLOGICAL REST

1. Surgery (manipulative or open) when indicated.
2. Fixation in the optimum positions—(a) optimum positions when restoration of function is anticipated; (b) optimum positions for ankylosis.
3. Maintenance of the integrity of the neuromuscular, vascular, and articular systems.

The writer believes that a therapeutic program as outlined will help the physician to understand more clearly the fundamental principles that are important in preserving the functions of locomotion; and it will make for order and clarity in the mind of the medical student as to treatment of diseases affecting locomotion.

Contractures and loss of function of the fingers and shoulder joint following treatment for Colle's fracture are evidence that part three of the program outlined was neglected. Extensive scar tissue webs binding the chin to the base of the neck or the arm to the side of the thorax could be avoided if part two were properly included in the therapeutic program of treatment for burns. The period of disability and hospitalization of patients with hæmatogenous osteomyelitis could be reduced if part one of the program were adequately executed. A large list of illustrations could be presented to demonstrate that the reason for numerous surgical hazards and loss of function of one or more parts of the

locomotor apparatus has been negligent application of one or more of the three phases of "physiological rest."

The principles of fixation vary according to whether restoration of function is or is not anticipated. Accordingly there are optimum positions for fixation when return of function is expected and optimum positions for ankylosis. The positions for fixation of fractures depend upon the type of fracture and the anatomical region fractured. It is not the purpose of this paper to review the numerous positions of fixation for all fractures but to emphasize the need of a clearer conception of the general treatment of fractures by means of physiological rest.

The optimum positions for fixation of the extremities and spine during the acute paralytic stage of infantile paralysis are shown in Table I. These positions are optimum because the lower extremities are in the most useful positions for the function of walking. The pelvis is on a transverse plane and the hips are abducted to favor the gluteal muscular mechanism which plays an important role in stabilizing the pelvis during the process of walking. The normal physiological curves of the spine are preserved. The shoulder is abducted and the elbow is flexed for the purpose of favoring those muscles which must function against gravity. The wrist and hand are immobilized in the physiological position of grasp with the thumb in the position of opposition and the fingers semiflexed (Fig. 1). Failure to apply these principles results in the development of contracture deformities which cause partial or complete loss of function of the upper and lower extremities and the trunk, as demonstrated in Figures 2a and b.

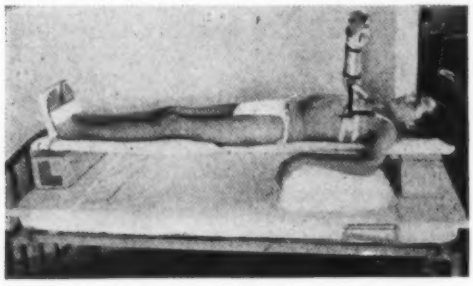

Fig. 1. Patient with extensive paralyses of both lower and right upper extremity during the acute tender paralytic phase of anterior poliomyelitis. The affected extremities are immobilized in the optimum positions for restoration of function. Proper fixation will prevent contracture deformities.

TABLE I.—OPTIMUM POSITIONS FOR FIXATION WHEN RETURN OF FUNCTION IS ANTICIPATED (INFANTILE PARALYSIS, ACUTE TENDER STAGE)

Shoulder
1. Abduction 90 degrees.
2. External rotation 45 degrees.
3. Anterior flexion (elbow in front of anterior axillary line).

Elbow
1. Flexion 90 degrees.
2. Supination.

Wrist
1. Extension 30 degrees (dorsiflexion).
2. Neutral as to radial and ulnar deviation.

Physiological position of grasp

Hand
1. Fingers in semiflexion.
1. Thumb in position of opposition.

Spine
1. Straight with the normal curves not exaggerated.

Pelvis
1. Transverse plane.

Hip
1. Abduction.
2. Neutral as to rotation.
3. Neutral as to flexion and extension.

Knee
1. Straight with support under popliteal concavity.

Foot and Ankle
1. Dorsiflexion 90 degrees.
2. Neutral as to inversion and eversion. Arches well supported. Toes side by side and extended.

Fig. 2. A, Residual paralyses of infantile paralysis with multiple preventable contracture deformities of spine, hips, knees, and feet. B, Patient after mechanical and surgical correction of the deformities. Patient had not walked since infancy. The contracture deformities were preventable.

Burns involving the axillary region should be treated with the arm abducted and externally rotated in order to prevent fixation of the arm to the thorax by scar tissue as seen in Figure 5.

Bowing of the extremities and disturbances of the normal weight bearing lines can be prevented during the active phase of rickets if the infant is immobilized on a Bradford frame or in a plaster-of-paris spica and not permitted to be weight bearing on the softened bones.

TABLE II.—THE OPTIMUM POSITIONS FOR ANKYLOSIS OF JOINTS

Shoulder
1. Abduction.
   (a) Adult 45-50 degrees.
   (b) Child 60-75 degrees.
2. External rotation—15 degrees.
3. Anterior flexion (arm in front of anterior axillary line.)

Elbow
1. Occupation.
2. Right or left handed.
3. Flexion 90 degrees with hand in mid-pronation. Ankylosis of both elbows—one slightly more and the other slightly less than a right angle.

Wrist.
1. Dorsiflexion 45 degrees.
2. Neutral as to ulnar and radial deviation.

Hand
1. Position of grasp altered by occupation.

Spine
1. Position in which normal curves are slight. Slight forward flexion of head and neck to accommodate walking and reading.

Hip
1. Adult.
   (a) Flexion 45 degrees sitting occupation.
   (b) Flexion 15-25 degrees standing occupation.
   (c) Abduction 5-10 degrees.
   (d) External rotation 5 degrees.
2. Child
   (a) Flexion 25 degrees.
   (b) Abduction 5-10 degrees.
   (c) External rotation 5 degrees.

3. Age
   Occupation.
   Degree of shortening.

Knee
1. Occupation.
   (a) Straight—standing occupation.
   (b) Slightly flexed—sitting occupation.
2. Child—complete extension.

Foot and ankle
1. Plantar flexion 5-10 degrees (altered by sex and shortening of extremity).
2. Neutral as to inversion and eversion. Arches supported. Toes extended and side by side.

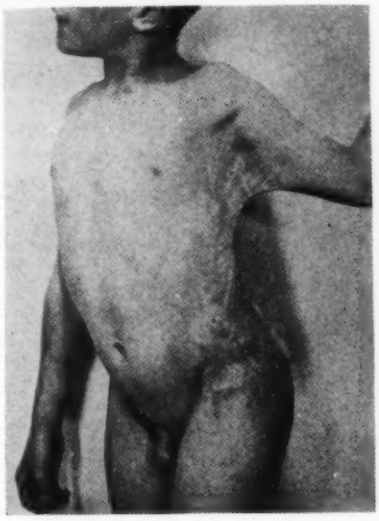

Fig. 5. Note the preventable scar tissue web between arm and horax complicating an extensive burn. Axillary burns should be treated with the arm in the optimum position for return of shoulder joint function (abduction and external rotation).

Deformity and loss of function of an anatomical part are frequently inevitable. Destruction and loss of function of the affected joint is the usual end-result in joint tuberculosis. Gonorrheal arthritis, ankylosing atrophic arthritis, compound intra-articular fractures, and non-specific joint infections not infrequently result in fibrous or bony ankylosis. Ankylosis of a joint may greatly or only slightly interfere with the functions of the apparatus of locomotion. The degree of disability depends upon the position of ankylosis of the affected joint. Loss of function of the hand is minimum and slight if the wrist is ankylosed in the position of dorsiflexion; but ankylosis of the wrist in extreme plantar flexion results in very marked loss of function of the hand. Ankylosis of the hip joint in one position may force the patient to walk with the aid of crutches, while ankylosis in another position may be associated with only moderate disability. The positions of ankylosis which cause the minimum of interference with the functions of the apparatus of locomotion are known as the optimum positions for ankylosis and may be outlined as in Table II.

The optimum position for ankylosis of certain joints varies according to age, sex, and occupation. The knee, during childhood, should not be ankylosed in flexion since with continued weight bearing the flexion deformity increases at the level of the epiphyseal discs. The position for ankylosis of the angle varies in men and women because of the difference in the height of the heels of the shoes. The adult patient should always be consulted regarding his occupation before the position for ankylosis is definitely determined.

The principles included in part three of the program of physiological rest are generally grouped under the heading of physical therapy. They include numerous measures which favorably influence the physiology of the various tissues which control the functions of the apparatus of locomotion. Assiduous attention to these measures often determines the success or failure of treatment. The integrity of the circulatory, neuromuscular, and articular systems can be maintained in the presence of certain disorders if mechanical and physiological principles are intelligently applied. These measures may be conveniently outlined as follows:

PHYSICAL THERAPY

I. The normal stimulus of function
   A. Weight bearing
      1. Partial
      2. Full
   B. Active muscular contractions
      1. With joint movements
      2. Without joint movements
      3. Assisted
      4. Unassisted
II. Elevation
III. Massage
IV. Heat—induced fever
   A. Local
   B. General—systemic
V. Cold
VI. Alternating heat and cold (contrast baths) (whirlpool)
VII. Electrotherapy
VIII. Heliotherapy
IX. Occupational therapy
X. Underwater gymnasium or therapeutic pool

Stiff and useless fingers should never result after proper treatment of a Colle's fracture if the patient is instructed actively and completely to extend and flex the fingers several times daily while the fractured part is splinted. The same patient will not lose the functions of abduction and external rotation of the shoulder on the affected side if the patient is instructed actively and frequently to place the hand to the mouth and back of the head while the Colle's fracture is immobilized. These principles are expressed in a phrase which may be applied to most fractures—"actively mobilize the muscles while the fractured bone is immobilized."

Muscles of an extremity can be actively contracted although the extremity is firmly immobilized in apparatus. This is often highly desirable in order to maintain muscle tone, to prevent atrophy and muscular contractures, and to maintain the integrity of the neuromuscular and articular systems. Several days after surgical treatment for internal derangements of the knee joint, the patient is instructed to contract actively the quadriceps muscle. Subsequent knee joint function depends upon the integrity of the extensor apparatus of the knee joint. Many patients who had torn semilunar cartilages treated surgically experienced continued disability because the quadriceps mechanism, paralyzed by the local surgical shock, was not re-educated.

The principle of elevation is simple and obvious but the lack of its application is seen daily.

Restoration of function following a supracondylar fracture of the elbow as well as many other fractures is aided by active motions under warm water. The heat stimulates the circulation and the buoyancy of the water relieves much of the weight of the extremity and gravity; as a result active motion is accomplished with less muscular effort and with less pain.

A child with residual paralyses of anterior poliomyelitis may be able to contract actively, exercise, and develop partially paralyzed muscles under water, but out of water the same muscles could not function against gravity and the weight of an extremity. Septic joints, hand infections, osteomyelitis, paralyses, fractures, and other conditions affecting locomotion will often show remarkable improvement if treated under water at the proper time during the therapeutic program. The number of illustrations to show the practical applications of these various principles is unlimited while the vast number of principles involved in surgical judgment and surgical technique will not even be considered.

The purpose of this paper is not to consider the details of management of any stage of treatment of the many disorders of locomotion but to present a general outline of the program of therapy which will tend to diminish the number of preventable surgical hazards.

The three phases of the program of physiological rest and the numerous principles implied in each should guide the clinical course of all patients suffering with disorders of the apparatus of locomotion.

Psychiatry

R. Montfort Schley, M. D.*

The conception of psychiatry has been in a state of flux for the past one hundred and fifty years. One hundred and fifty years ago insanity was considered as a visitation of Satan, something inexplicable, except that it was supernatural. Believing that insanity was a visitation of the Devil, people thought that it should be driven out by mortification of the flesh, and they devised all sorts of tortures, fiendish in character, to drive out the evil spirit. The insane were placed in foul dungeons with their hands and feet chained to the wall. Iron cribs were made in which the insane patients were placed, and a lid fastened over it, so that they had to lie out straight all the time, and could neither sit nor stand. They were kept in the common jail or poor-house with no care or attention. Dr. Pinel (1744-1826) in France was the first to look on these people as having mental disease, and he endeavored to ameliorate their condition. His humanitarian treatment met with much opposition. Sermons were preached against improving the condition of those who had been visited by God with the condition in which they found themselves. Those who cared for these miserable people did not wish to have things changed. They were simply keepers of the insane, and change would require thought. To think is difficult for the majority of people, and change for the better is synonymous with thought. So all changes have been accomplished with great difficulty and with antagonism from those who have been having control of the situation. The same opposition was directed against the theory of germs as being the cause of disease, and against the modern treatment of tuberculosis.

New York State has always been in the lead in its care of its insane. In 1843 the Utica State Hospital was founded as a hospital for the care of insane patients who were curable and this was over thirty years after Pinel had started his humanitarian care of the insane. This institution was under the superintendency of Dr. John Gray, and it became noted for its humane and progressive treatment of its patients. The major part of the insane people in New York State tried to enter this hospital for care. The demand was so insistent that more hospitals, of a similar nature, were established by the state. Dr. Gray had chosen active and forceful young men to help him in the care of his patients, and they were sent out as superintendents of the new hospitals, then they, in turn, trained other young men so that the standards and ideals of the first great men are the same standards and ideals of the present State Hospital System in New York.

These first workers felt that mental diseases were organic in character and, if the affected brains were thoroughly and carefully examined, the cause of the disease could be discovered. So, for many years, the brains of those who died in the institutions were removed and thoroughly studied, microscopically. But, after years of study, this was finally abandoned as a failure.

During the latter part of the nineteenth century, Kraepelin of Germany, started the modern nomenclature of psychiatry. He definitely separated the different types of insanity and gave them the names they bear to this day. Instead of calling them mania, melancholia or demented, he definitely divided these words and showed how the same disease could have a combination of symptoms. Many went from this country and studied in his clinic. The psychiatry of this country bears the imprint of this one man.

Then, for a number of years, the Hospital Service drifted along in an aimless manner and attention was given only to the care of the patients. In 1900, Dr. Frederick Peterson was made president of the Lunacy Commission and he became greatly interested in the patient, himself. He appointed Dr. Adolph Meyer as Director of Psychiatry for the State of New York. Then, under his great and able leadership, a careful history was taken of each case and, from mere keepers of the insane, each hospital became a hospital, in fact, for the care of the mental patient. Staff meetings were held at stated intervals and at these, all the new cases were presented. Young men who entered the service were sent to the Psychiatry Institute in New York City for the intensive training in their specialty, and they became true psychiatrists. Each hospital had a pathologist and a director of psychiatry, who led the work of the staff physicians on the patients, and coordinated the findings of the staff.

The mass of material produced in the 50,000 cases in New York State hospitals led many of the men on false scents. Many worked on the endocrines and believed that insanity was due to a disturbance of these ductless glands. Others thought that insanity was due to early training and environment.

During the past fifteen years, there has been a great development in the psychological outlook on life, both normal and abnormal. Freud believed that all abnormal changes of thought were definitely due to un-

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fulfilled wishes and, by certain methods of psychoanalysis, these wishes could be discovered and changed and the patients could thus be cured of their abnormal thoughts. Freud did a wonderful piece of work in the advancement of the study and knowledge of abnormal psychology. This, like many other conceptions which have some truth in them, was carried to extremes by its devotees, who felt that every abnormal person could be cured by this method, only to be disappointed by finding that it had definite limitations.

In this welter of material the psychiatrist has definitely found an answer to his many problems. We now known that the majority, if not all, of the insane, who do not have an organic foundation for their mental diseases, are mentally sick as a means of flight from the realities of life.

Dementia praecox is the mental disturbance, as the name implies, which occurs at the time of adolescence. These children are odd and different from birth. They have but few friends and are generally lonely, do not mix with others and are of a "shut-in" character. They do fairly well until they begin to assume the responsibilities of life, when they develop a defense reaction to these responsibilities, which reaction is manifested in an incurable insanity. For example, a short time ago I had the case of a young man, a mechanic, who, when single, was able to make a living. He married, and began to have great difficulty in meeting his obligations. They had one child, and he started to run in debt. When the second child arrived the situation became hopeless and he could see no escape. He was very religious and the Bible had said, "Cast your burdens on the Lord." He soon developed delusions and hallucinations, believing that he could hear the Lord command him to save the world. He went out on the street, accosting everyone and assuring all that he had been sent to save their souls. But, the public not believing him, he was sent to the observation ward of a hospital where he proved to be a well developed case of dementia praecox. There are three types of this condition, hebephrenia, catonia and paranoia. The treatment of the condition is to recognize a potential dementia praecox case and protect him, as far as possible, from assuming too great responsibility in his life.

Manic depressive insanity generally occurs in a member of a family the individuals of which have either this type of mental upset or some other neurotic manifestation. This is generally brought on by some definite exciting cause such as disappointment in love, or some serious psyhic strain. This mental condition is manifested by either a maniacal or depressed syndrome. The same person may have one attack of the maniacal type followed later by depression. There are a number of people who are considered to be normal through life yet who have a mild form of this mental condition. The excited type is very distractable, going from one subject to another for no apparent reason, only a word being necessary to start them on another train of thought. In the depressed condition the patient is slow in all his actions and all his mental processes, with great fear and anxiety of everything which comes to his attention. All these cases recover from their insanity, but are very liable to a recurrence of the condition under any unusual stress. These people can be kept well if they are carefully studied and all stresses and strains removed.

Individuals inevitably grow older, and eventually reach the involutionary time of life, when they start on the down grade, both mentally and physically. Then the disappointments of life are brought more forcibly to their attention, and they see no chance of retracing their steps and correcting their past mistakes. Some of those have involutional melancholia. This condition is characterized by an apprehensive depression with delusions of sin. They are generally individuals who have led a very circumscribed life with little outlet for pleasures, who have no sense of humor, and little or no opportunity to develop their ego. They are those who have been tied to a book-keeper's job with responsibilities which would not allow them any outlet. Having little or no imagination, they are chained to the dreary routine of life. These people many times develop the delusion that they have committed an unpardonable sin. For example, one man had short-changed a friend ten cents some years before. He was firmly convinced that this was his unpardonable sin. These people moan, cry, and wring their hands and many believe that the only way they can atone for their misdeeds, is by self-destruction. In this type of case, we find the most suicidal patient.

Alcoholics and drug psychoses generally fall to the lot of the weak-willed individual who cannot say, "No," who is perfectly willing, for the pleasure of the moment, not to reckon the consequences. They are the type of individual, who is easily led and influenced. After a long continued use of alcohol or drugs, definite organic brain changes take place with the onset of insanity and dementia.

The psychoneuroses are those who are the borderline cases, who show, at times, normal reactions, and again abnormal ones. They are generally neurotic with vague mental and psychic symptoms. They are the patients who are found in the physician's office at all times, and they are the bane of his existence, always finding new symptoms for the complaint. The hysteria major, neurosthenic and anxiety neurosis are the various names given to this type of case. If these people have means, they go to institutions where they enjoy poor health along with others of their kind. If they have no means, they can, in many instances, be shown the fallacy of their position and may become self-supporting and suppress their many symptoms. If not, they drift from public hospital to hospital in an endless chain.

In the treatment of the insane, physical therapy is, by far, the most important means we have for the care of these patients. This is particularly true of hydrotherapy for stimulation and sedation. Disturbed cases are quieted by warm, continuous baths or packs.The most disturbed patients are often quieted by these means alone and they often ask for the treatments. Tube feeding frequently has to be resorted to for those who have the delusion that they cannot take food.

In closing, I wish to emphasize the marked change which has taken place in the conception of insanity during the past twenty years. Two decades ago all psychiatrists were drifting in an aimless manner, hunting for the cause and the treatment of mental conditions. As a result of the advancement of psychology, we now know that it is a disease of personality, and that the only means of approach is the psychological one which gives us our only hope for the cure or amelioration of this distressing and, sometimes, hopeless condition.

Dislocations of the Clavicle

Frank N. Potts, M. D.*

An injury that can produce a loss of sixty percent use of a part, is one of such potential danger as to warrant a thorough understanding of the subject. It is only with such understanding that we can hope so to treat it as to lessen the percentage loss.

It is not difficult to differentiate the functions of the clavicle. They are twofold. It acts as a point of attachment of some of the muscles of the anterior chest and of the front and sides of the neck, but to a greater degree, it acts as a strut or yard arm from which is supported the upper extremity. The arm is thus held freely away from the body and its full complement of motion is possible. A deviation from this architectural plan immediately places the arm at a great disadvantage. The range of motion is impaired and the strength is lessened. Only as long as the clavicle can butt up against the sternum and against the acromion process, is it a fixed point. The arm then is suspended freely away from the body. Without this support the strong pectoral, the teres, and the latissimus dorsi tend to bring the arm close to the side and to interfere with its normal function.

Important as its function is, the clavicle is poorly protected against the stress and strains brought to bear upon it. There is nothing about the shape of the clavicle or the points of articulation that make it a mechanically strong bone, or about the joints themselves that make dislocation difficult. Quite the contrary. The articulations are mechanically poor compared with those of the hip, shoulder, ankle or elbow. The clavicle maintains its relation to the sternum and to the acromion through the attachment of the ligaments.

The clavicle is exposed to injury. It lacks protection of a muscle covering. It functions in conjunction with a most active part of the body, the arm. Its outer end is fashioned obliquely and a shearing force is therefore more dangerous. Blows received on the calvicle, force brought to bear on the arm at the upper end, transmitted force through the elbow and blows on the acromion proper, all tend to dislocate either the sternal or the acromial ends. Football is an ideal game to produce such an injury. The hazards of industry, the collapsing ditch, the fall from a ladder striking either on the upper part of the arm or on the elbow, produce such injuries, and certainly the complex forces of the automobile accident produce them. Yet these dislocations are not common. There is nothing in the text books that would indicate their frequency or what percentage of all dislocations are sustained by the clavicle. Conference with radiologists, orthopedic and general surgeons, result in statements that in their experience such dislocations are not common. Brown[4] states that ten percent of all body dislocations are of the clavicle, mostly at the outer end.

The sternal end of the clavicle is slightly expanded. The plane of attachment is perpendicular. It receives some support from the top of the first rib. There is a capsular ligament of considerable strength (except at its lower portion). This weaker part is compensated by the ligament a short way external, the rhomboid or costo-clavicular, that is attached to the under side of the clavicle and to the upper surface of the first rib. The front of the joint is reinforced by the claviculo-sternal ligament. There is a similar ligament posteriorly. An interclavicular ligament is described. This passes over the top of the sternum, forms the base of the supra sternal notch and connects with the capsule of the opposite clavicle. The movement of this joint is limited. There is a gliding motion at the interarticular surface on elevation or depression of the shoulder and a movement on the sternal facet when the shoulder is moved backward and forward. The range of motion is limited by the ligaments rather than by the shape of the joint.

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Dislocations at Sternal End

The dislocations at the sternal end are less frequently seen than those at the outer. Depressing the shoulder may lever the clavicle on the first rib and in that way tear the sternal end loose. The deformity is usually with the clavicle up and slightly back. It varies greatly in degree and the deformity or displacement may be so great as to produce pressure on the trachea thus producing dyspnoea[1]. There may be a displacement on top of the sternum, approximating the two clavicular ends. The costo-clavicular ligament as well as the capsule is lacerated. The tearing loose of the ligamentous structures may also result in periosteal damage. This was brought to attention on an attempt to repair a sternal end dislocation after some two months. To make the repair was impossible because of the extensive periosteal damage and new bone formation resulting from the periosteal stripping from the under side of the clavicle for two inches. The stability of the shoulder girdle is disturbed as the buttressing end is lost. The arm approximates the chest wall, and the head is turned to the opposite side. The sternocleido mastoid is less prominent. It is difficult to raise the arm above the horizontal. The abnormal site of the end of the clavicle can be seen and felt. There is a record of a retro-sternal displacement and also one in reference to a downward displacement. The upper and backward is the most common. There is considerable pain connected with this injury, a sense of great weakness in the arm and dyspnoea and dysphagia may be present. X-ray corroborates the physical findings.

Treatment: There is seldom difficulty in replacing the clavicle. The reduction is facilitated by pressing the head of the humerus backward. This procedure brings the clavicle out in its long axis and the sternal end is brought in a plane with the sternal joint. Manipulation of the clavicle will assist. The reduction is easily accomplished, but it is seldom possible to retain the reduction. The weight of the arms, the plane of the joint, the strong neck muscles all militate against satisfactory results. Fairly good functional results are obtained in some instances without anatomical reduction. There is always the apparant deformity. The repair is weak and the strength on the shoulder girdle greatly impaired. The conservative treatment consists of placing a felt pad over the reduced clavicle at the sternal joint and a long strip of adhesive starting from the opposite axillary border of the chest, passing over the clavicle, well down on the back, then bandaging with the arms drawn backward and bandaged to a T splint or dressed so as to maintain the correct position. It is usual however, to find the dislocation present on the next inspection of the

dressing. Early open reduction and fixation is the most satisfactory treatment. The most simple procedure is to drill through the upper border of the clavicle into the articular surface and make a corresponding drill in the sternal surface. Fascia strips make the best sutures. Then the torn ligaments are repaired as well as is feasible. This will tend to restore the capsule. There should also be a suture passed through the lower half of the clavicle one inch distal to the joint and fastened to the first rib. This is to restore the costo-clavicular ligament.

Marxer[2] operated by separating the capsule on the anterior surface of the clavicle and the sternum, making two drill holes in the perpendicular place, one at the clavicle and one in the sternum, connecting the upper end of the clavicle and sternum, by passing fascia through and then continuing the fascia through, so as to connect the lower two as well. By so doing, he did not disturb the joint surface and avoided arthrodesis. He also fastened the clavicle down to the first rib. The capsule was sutured over the fascial strands. This gave an excellent mechanical fastening.

Other material than fascia has been used. The metal fixing agents have been very popular. Heavy silk has been used. These have all been superseded of late by fascia. Proper fixation of the arm to the side for four weeks, followed by a sling for two weeks and the necessary physical therapy, to restore the motion and strength to the arm, will result in an excellent functional and cosmetic result.

Attempts have been made and with success, to produce bony fusion. It would not seem that this is desirable. The motion, though slight, is of great value in the comfortable use of the arm. A proper repair and fixation with fascia in conjunction with fixing the clavicle to the first rib, is by far the better mechanical correction of this disability.

R. Brown[4] wired the dislocated clavicle to the sternum with good results.

Lowman[5] used fascia, after removing callosities, resulting from periosteal tears. He brought the joint surfaces together, sutured in soft tissue so as to replace torn ligaments. He produced a stable joint and avoided arthrodesis.

Bergen[6] resected the end of the clavicle and reported a complete recovery. This would shorten the shoulder girdle and would not seem advisable.

Wachendorf[3] resected sternal end of clavicle and fastened end of clavicle down to joint capsule.

Van Ortenberg[7] fixed the clavicle to the sternum with wire.

In an instance recently encountered, a boy of twelve had been injured in an automobile accident. The left clavicle was dislocated at the sternal end. The dislocation was upward and backward. He had been treated conservatively with the result that at the end of two months, he had a marked deformity which was sensitive. There was, as far as could be determined a firm fixation, although on moving the arm, spring was present and he stated it pained him to carry heavy objects. X-ray showed the dislocation. It was thought that if the joint were opened, reduction and a surgical repair could be made. The clavicle was exposed, but it was impossible to move it down to the sterno-articulation because of a large amount of callus on the under side. The contour of the clavicle did not indicate fracture, and it was thought the callus represented periosteal stripping from the under side. Considerable callus was removed. An incomplete fracture was made one and one half inches out from the sternal end. The short fragment was bent down and the short end fastened to the sternum. After an uneventful convalescence, it was noted that the deformity was distinctly less, there was no pain in the sternal end, and the sense of weakness disappeared. It was thought that the procedure was distinctly worth while.

Dislocation at Outer End

The dislocation at the outer end is more common, while it is usually a unilateral dislocation, there are reports of bi-lateral dislocations at the acromio-clavicular articulation. The degree of dislocation is dependent upon the amount of damage to the ligaments controlling the stability of the joint. A review of these ligaments and their function is proper. They hold the clavicle to the acromion and to the coracoid. The acromio-clavicular ligaments bridge the space between the two bones and extend for some distance on the upper and under surfaces of the clavicle. They constitute a capsule for the joint. Also the strong coraco-clavicular ligament extending from the under side of the clavicle at the outer end to the coracoid process and the strong broader ligament extending from the coracoid to the acromion process, help to stabilize the joint. The coraco-clavicular is probably the most important as it maintains relations of the clavicle to the acromion by pulling it down. Obviously, if the acromio-clavicular ligament is ruptured and not the coraco-clavicular, the degree of upward dislocation is limited by the latter. This accounts for incomplete separations. If the coraco-clavicular is also ruptured, there is no resistance to a complete dislocation, and such takes place. The latter is less common than the former. These same ligaments govern the range of motion at the shoulder joint in so far as they cause or allow the scapula to rotate and follow the clavicle. They also prevent the acromion from slipping under the clavicle following blows upon the shoulder. As the scapula is carried forward, there is some rotation around the clavicle. This too, is largely governed by the coraco-clavicular ligament.

Little difficulty is present in detecting the dislocation. The outer end of the clavicle is very prominent, up and somewhat back of its normal position. The skin is tense over this point. The scapula rotates forward. There is considerable pain and all active movements of the arm are restricted. The need of support to the arm is apparent. The laxity of the joint can be determined on examination. There is little reaction in the nature of ecchymosis or swelling. There is a feeling that the arm is about to drop from the body; the patient rigidly supports the arm and motion is very painful. The reduction is easily accomplished. The arm is rotated outward, abducted, and pressure on the outer third of the clavicle readily brings it in the proper relation to the scapula. This reduction however cannot be maintained, that is, in those cases where there has been a tear of the conoid and trapezoid ligaments (coraco-clavicular ligaments.) Without a stable joint here, there is likely to be pain, weakness and some loss of motion, as we have seen that the scapula rotates about the end of the clavicle, and also that the acromion may slide under the clavicle and in that way interfere with abduction.

The x-ray may be misleading, in that the patient may be holding the arm needing the support. Also the position of the tube may be such as to make the joint look either worse or better than it really is. Comparative films of the normal side in the same position should be made.

The necessity of treatment is obvious: Without res-

toration to approximately normal, we have a residual weakness, restriction of motion, pain, unsightliness and a traumatic arthritis. The object of treatment must be two-fold; to restore apposition of the clavicle and acromion, and to maintain motion. These are closely allied. If the clavicle continues to ride up, there will be excessive callus in attempt at repair. There will be a loss of motion as joint surfaces are not functioning, and there will be some spurs develop, resulting from periosteal tears that inevitably take place. Conservative treatment for the complete separation is not satisfactory. In those cases, and they constitute the majority, that are incomplete, one may accomplish much, in fact get very satisfactory results by the conservative methods.

Immobilization of the arm is necessary by such dressings as will hold the shoulder up and the clavicle down. The pressure on the clavicle must be limited to the outer third. A pad of firm felt three inches square is cut, strips of adhesive three inches wide and long enough to pass from the crest of the ilium over the clavicle and down the back to the same level, are prepared. The adhesive is applied anteriorly to a point just below the clavicle, the pad is placed on the joint, an assistant, by pressing up on the elbow with the arm at the side raises the point of the shoulder as high as possible, the felt is then strapped down as the adhesive is drawn over the shoulder and down the back of the arm to the flexed elbow, along the arm and over the normal shoulder. A pad is placed in the axilla and under the hand, and the arm is strapped to the body with a wide adhesive, and then covered with a flannel bandage. It is firmly bandaged so as to hold the elbow high and the shoulder somewhat backward. In many instances, this will suffice to maintain a reduction if complete dislocation has not occurred. Such dressing is renewed as often as necessary for four weeks; then the arm is continued in a sling for ten days. If complete dislocation has occurred, open reduction and repair is advisable at once. There has been no standard technique for this treatment. Treatment has carried from arthrodesis of the acromio-clavicular joint, repair of the acromio-clavicular ligaments and repair of the torn trapezoid and conoid ligaments, replacement of these ligaments by wire[9], silk and fascia. It is interesting to note that surgeons have gradually got away from the metal fixations and of late are using fascia.

Dunlop[10] attempted and succeeded in repairing the torn acromio-clavicular ligament by weaving the frayed portion together.

Carroll[11] operated by substituting a new ligament for the acromio-clavicular ligament by using a strip of fascia one-half inch wide and about five inches long, passing it through the clavicle and coracoid in the direction of the fibres of the torn ligament.

Duncker and Brandenburg[12] bound the clavicle to the coracoid with fascia, but had some restriction in motion. They also fastened the clavicle to the acromion with fascia. This is probably the reason why the motion was lost.

Watkins[13] connected the outer end of clavicle and coracoid using silk, and dressed the arm in abduction in plaster for three weeks, with functional results.

Bunnell[14] fastened the clavicle and acromion together and the clavicle down to the coracoid with fascia. He did this by threading a ten inch piece of fascia through the end of the acromion to the end of the clavicle around the coracoid and up to the starting point of the acromion. This made one continuous ligament. The arm was supported in a dressing for about two weeks. An excellent result was obtained.

Mitchell[9] used silk connecting the clavicle and the acromion.

Marconi[8] found it necessary to resect part of the end of the clavicle before he could reduce same. He then forked the acromion and put the end of clavicle in same, fastening with silk. This produced an arthrodesis. He has also used silver wire. At one time he used a metal screw through the acromion and into the clavicle, which was removed later. He bound the clavicle to the acromion with wire.

The same principle of treatment is applicable to the dislocation at either end of the clavicle, namely, stabilization without loss of motion. While it is the easier way to fix the joint by drilling through the joint surfaces and fixing with some agent, this is frequently followed by arthrodesis and that should be avoided. Undoubtedly the best fixing agent is fascia. In both dislocations, fixation can be obtained by drilling through the shaft of the clavicle near the end and passing the fascial strip to the first rib at the sternal end and to the coracoid process at the acromial end. This makes an anatomical and excellent mechanical fastening; the joint surfaces are not further damaged and the deranged surfaces are approximated. The capsule can then be repaired. Adequate fixation can best be attained by the use of plaster of paris. A body plaster is applied and the arm on the involved side placed in plaster and fastened to the body plaster with the arm drawn just back of the anterior axillary line. Four weeks fixation in plaster and two in a sling gives adequate time for strong repair. Massage and passive motion should be given until the range of motion at the shoulder is such that active muscle work can be undertaken.

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Nutrition in Relation to Disease

Walter C. Russell, Ph. D.*

Many attempts have been made to devise diets for the cure of certain diseases or for the improvement of health and general well-being. For years people have eagerly taken up various dietary regimes and fads with the hope of feeling better, a fact which indicates that many people are in a sub-normal state of well-being. The discoveries of recent years in the field of nutrition have led workers to hope that the use of findings such as the value of an adequate vitamin and mineral supply and variety of proteins, would lead to a general betterment of health; and perhaps the correct and continuous use of the various food constituents will do so. Dietaries have been prescribed and sold by so-called food experts which have been constructed upon the basis of what the expert thought they should be rather than as a result of experimental or clinical findings. The discoveries of recent years in the field of nutrition were not motivated by a desire to provide dietary regimes but by a desire to learn the fundamental basis of nutrition.

The use of diets in the treatment of disease is not a simple problem. It is complicated by many factors. Thus a dietary insufficiency in infancy or youth may cause a condition which cannot be repaired by any dietary measures in later life. The individual may have certain hereditary deficiencies which cannot be overcome by any kind of feeding regime. A hormone or internal gland deficiency may exist which cannot be brought to normal by foods ordinarily available. A condition of subnormal health may be due to the type of nervous system possessed by an individual which overshadows the good effects of a dietary. However, if a subnormal condition of health or disease conditions are not complicated by other factors, the use of certain dietary regimes may prove of great value.

The objective of the nutrition chemist is to determine in detail what chemical substances are required by the normal organism, and, in so far as possible, the amounts in which they should be consumed, in order to maintain normal health. The first objective is being slowly attained in the case of the human but only meager information is available with regard to quantitative requirements. Of the present deficiency diseases, only rickets, pellagra and goiter are encountered to any extent in the acute stage in this country. Xerophthalmia, due to vitamin A deficiency, beri-beri, due to vitamin A deficiency, and scurvy, due to vitamin C deficiency, are only rarely noted. While it is not fully established that pellagra is due to lack of vitamin B (B_2), considerable evidence has accumulated in favor of this concept.

Ever since the discovery by Mellanby in 1918 that cod liver oil contained something which cured or prevented rickets in puppies, and the application of this discovery which was made in the case of infants almost immediately afterward, research workers have been engaged in further studies of the cure and prevention of rickets. Cod liver oil is still widely used as a specific for rickets and in recent years considerable attention has been given to irradiated ergosterol, available as the product "Viosterol." Both of these substances cure or prevent rickets in the infant but their use necessitates special attention on the part of the mother. Milk, as ordinarily produced, does not contain a sufficient amount of the antirachitic factor to be effective in rickets. Within the past few years milks have been produced and are now on the market, which carry sufficient vitamin D to act as a cure or preventive of rickets in the infant. This food, with its ample supply of the principal bone building elements, calcium and phosphorus, and carrying a sufficient amount of the antirachitic factor to permit the normal utilization of these elements, furnishes an ideal combination for what might be called the automatic control of rickets. Thus, the use of such milk obviates attention on the part of the mother as to whether the child receives an adequate source of vitamin D in addition to the milk. On a large scale, milk can be made antirachitic by irradiation of the fluid milk, and when small scale production is involved antirachitic properties can be given the material by feeding substances of high antirachitic potency to the cow, such as irradiated yeast. Vitamin D milk, then, should place in the hands of the physician an effective and easily used food for combating rickets. Milk, with its vitamin D potency increased to an effective level, becomes our only common food which has sufficient of this factor to cure or prevent rickets in infants.

When experimental animals are deprived of vitamin A the various epithelial linings, as those of the respiratory and digestive tracts, become abnormal and an adequate use of an amount of this vitamin will cure this condition. The same situation has been found to be true in the few cases which have been reported of autopsy findings in the case of infants. Extensive studies of the effect of amounts of vitamin A larger than those ordinarily included in a normal food supply have failed to show an increase in the resistance of individuals to infections such as those which cause the common cold. Thus at the present time there is no conclusive evidence that an amount of vitamin A in excess of that occurring in natural food supplies has "anti-infective" properties. Therefore, the designation of vitamin A as the "anti-infective" vitamin is not correct if one consumes a dietary with liberal amounts of this factor present, such as is the case when ample quantities of milk, eggs and green vegetables are included in the daily intake.

One of the outstanding features of scurvy in the guinea pig due to vitamin C deficiency is the loosening of the teeth and the changes in certain of the dental structures. This observation has led to the suggestion that dental caries and gingivitis might have their origin in a vitamin C deficiency. Extensive studies of the incidence of dental disturbances in groups of children and their relation to the vitamin C content of the diet has led to the observation on the part of some workers that the addition of fairly large quantities of vitamin C containing foods such as a pint of orange juice per day, leads to a disappearance of the condition known as gingivitis and an arrest of some of the dental caries. However, such observations have not been confirmed by other investigators and there is still the question as to whether any beneficial effects are due to the vitamin C of orange juice or some other factor. Certain investigators believe that dental caries is associated with such factors as the acidity of the diet, a deficiency of phos-

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phorus in the diet or the phosphorus content of blood and saliva. The real cause of dental caries has not been determined. There may be one dietary factor concerned or there may be several. It seems certain, however, that faulty diet is a common factor in diseases of the teeth.

There is some evidence that vitamin G (B_2) is an anti-pellagric substance. The disease condition known as pellagra which occurs to some extent in the southern part of the United States responds to dietary measures, and the use of foods which are rich in vitamin G, such as yeast, milk and fresh vegetables, have been found to be effective as anti-pellagric agents.

The discovery of a few years ago that liver contains a substance which is effective in the cure of certain types of anemia stimulated a very active interest in this field of investigation. Briefly, deficient blood formation may be due to several causes and a number of factors may be involved in this deficiency, but fairly specific information is available only in the case of certain types of anemia. Thus, there may be a deficiency of the red blood pigment, hemoglobin, on account of a lack of iron in the dietary. Probably the simplest case is that of lack of iron, a deficiency which can be taken care of readily by the inclusion of foods of the iron-rich type. A more serious disturbance of blood formation is the pernicious type of anemia. In this condition there is usually an abundance of hemoglobin available but a deficiency in the formation of the stroma or structural part of red blood cells. The feeding of liver in large amounts produces an immediate response in which the number of red blood cells is increased. Just what this anti-anemic principle is has not as yet been determined. In a number of cases the nutritional anemia, produced in rats maintained on a diet consisting wholly of milk, has been cured by the feeding of iron and traces of copper, whereas the feeding of iron alone was ineffective. This type of defiiency is not likely to arise except in the case of young infants subsisting almost wholly upon milk on account of the widespread occurrence of copper in natural foods.

Reports are appearing in the literature of the favorable results of the amino acid glycin, in cases of progressive muscular dystrophy. Although evidence is by no means conclusive, yet in those cases in which this disease is definitely of nutritional origin, some success has been reported as a result of the feeding of fairly large quantities of the amino acid, glycin.

No marked progress has been made in recent years concerning the fundamental causes of obesity. At the present time this condition may be classed as of exogenous origin, that is, obesity which is due principally to over-indulgence, and that of endogenous origin, which may have a hereditary basis or may be due to certain endocrin disturbances.

The lack of an adequate supply of iodine in the food intake is still recognized as being associated with goiter, but investigations are in progress to determine whether there are other causes of a nutritional type involved.

Just how much an individual who consumes regularly an ample, varied diet of vegetables, fruits, meats, cereals, tubers, roots, eggs, and milk suffers from what may be called sub-acute nutritional disturbances is not known, and it will not be possible to answer this question until methods are available for the detection of such disturbances and more has been learned with regard to quantitative food requirements. Well-being and resistance to disease are undoubtedly increased by the consumption of an adequate, varied diet but actually our knowledge of specific nutritional factors which are effective in the cure or prevention of disease is very limited. Of the diseases which occur commonly in the United States, the action of vitamin D in the cure or prevention of rickets, of iodine in relation to goiter and of iron in certain types of anemia are definitely known. Vitamin G (B_2) may be specific in pellagra and certain types of anemia respond to a substance or substances of an unknown nature in certain foods such as liver. Vitamin A is specific in night-blindness and xerophthalmia, vitamin B (B_1) in beri-beri and vitamin C in scurvy, but these diseases occur only rarely in this country.

The Paraffin Bath

James A. Dickson, M. D.*

In the minds of many orthopaedists and industrial surgeons there seems to be considerable doubt and confusion regarding the efficacy of the paraffin bath as an adjunct in physical therapy, a type of treatment which was instituted in the orthopaedic hospitals of the British army. In some instances this doubt results from entire ignorance of the method and the lack of any experience with it, and in others, from rather feeble, half-hearted use of the method with crude and inadequate equipment. After several years' experience with this form of heat in the treatment of arthritis and post-fracture cases and of the extremities, I am convinced that it is one of the most valuable phases of physical therapeutic practice.

We have two baths, one for the hands and arms, and the other for the feet and legs. They vary somewhat in shape and size, but are identical in principle and construction. The tank (Fig. 1) is made of stainless metal, of such size that the whole extremity can be immersed in the bath. It is equipped with electric heating coils, controlled by a switch and thermostat at one end and is lined with an insulating material. The patient is protected from any possible contact with the metal by a cradle of wooden slats which covers the bottom and lines the sides of the tank. The bath is filled to within three or four inches of the top with paraffin containing twenty-five per cent petrolatum.

Each morning the bath is heated until all the paraffin is melted, which usually requires about an hour. The paraffin is maintained at a constant temperature throughout the day. The temperature is about 130 to 135° F. At night, the current is turned off, and the bath is covered with a woolen blanket to conserve whatever heat remains.

The hand and arm, or the foot and the leg, of the patient are bathed and carefully dried. Then the patient dips his hand in and out of the bath quickly, so

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that a thin coating of paraffin congeals on the skin. This process is repeated several times, until the glove of paraffin is of sufficient thickness to allow the extremity to remain in the bath with comfort. The patient keeps his hand immersed in the bath for from ten minutes to half an hour. Then the glove of adherent paraffin is removed and massage and muscle reeducation are instituted. The skin always remains soft, pliable and moist by this procedure, and a characteristic hyperemia results which is not obtainable in any other way. The paraffin bath is much more comfortable than the whirlpool bath or the dry heat from a baker, and the sensation of warmth and the hyperemia seem to persist considerably longer after this treatment than with other forms of physical therapy.

Objections have been raised to the paraffin bath on the ground that the patient is receiving no more heat than in a whirlpool, even though the temperature of the paraffin bath is higher, because the coating of paraffin next to the skin acts as an insulator. This method has also been condemned on the basis that it is less sanitary than other procedures, and because it can not be used for treating extremities with open wounds, as can the whirlpool bath. The first objection can be answered by saying that regardless of whether or not the actual temperature is higher, a more satisfactory and persistent hyperemia is obtained than with the whirlpool, with the added advantage that after the bath the skin is smooth and moist, instead of withered and shriveled as it is from contact with the water. As for the second objection, in our experience it has been negligible, with the precautions of cleaning out the tank frequently, and insisting that each patient be bathed carefully before entering the bath. We never use the paraffin when there is an open wound—relying on the whirlpool bath in such cases.

These remarks are published at this time, merely to remind those who use physical therapy that the paraffin bath, when properly employed in suitable cases, has a distinct place in the armamentarium of every well equipped physical therapy department.

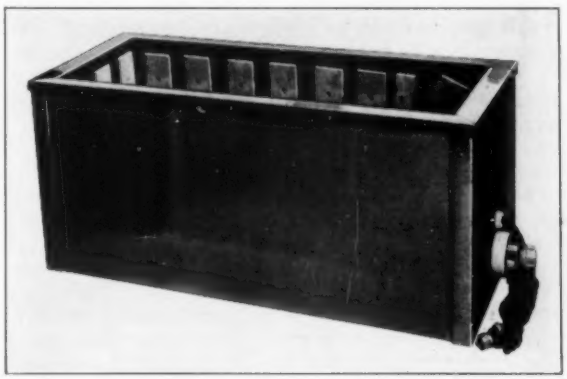

Fig. 1. Paraffin bath for hands and arms. Inside dimensions 26 x 10 x 10 inches. Outside dimensions 30 x 13 x 12 inches.

An Apparatus for the Production of Local Heat in Body Tissue

By Means of High Frequency Electric Fields

Francis W. Bishop*

Diathermy machines, infra-red radiation, hot compresses, etc., have been used for many years for the production of heat in local parts of the body in the treatment of disease, particularly arthritis. In the case of heating lamps, the penetration of heat is so slight that the temperature of the deep parts is not appreciably raised. In cases in which heat is transmitted by conduction, as in hot compresses, the dissipation of heat by blood flow through the part treated makes it impossible to administer heat to the deep structures. With diathermy machines, in a case in which a high frequency current is passed through the part by means of electrodes directly applied to the skin, there is produced a through-and-through heating, and such machines have sufficient power to overcome the dissipation of heat by blood flow, etc., and to maintain the elevated temperature of the part as long as desired. However, it is difficult at times to attach electrodes to certain parts of the patient, such as the shoulders, and there are certain difficulties in securing good contact with the skin.

Through recent advances in the radio field it has become possible to apply energy to a part of the body and cause a rise of temperature in the tissues without an actual application of electrodes; in other words, we now have an apparatus at our disposal which retains the advantages of a diathermy machine as far as deep heating is concerned, but with many of the disadvantages eliminated. It can be constructed in any well equipped laboratory and need not then cost more than an ordinary diathermy machine. Carpenter and Page[1] describe a radio apparatus of high power for the raising of the systemic temperature. Pätzold[2] describes a lower powered machine for the local application of this form of energy. However, no circuit and but few data are given. We propose to describe in detail an apparatus constructed in this laboratory and which has been applied clinically for some time with good results.

If the essential circuit requirements are complied with, there is considerable latitude in the arrangement and design of the apparatus, as well as the manner of application of the energy to the patient.

The machine consists essentially of a high frequency vacuum tube oscillator, operating at a frequency of about 10,000 kilocycles. The output of the machine is led to two insulated plates between which the part of the body to be treated is placed. An intense, rapidly fluctuating, electrostatic field exists between these plates, and the

From the Division of Radiology of the Department of Medicine, University of Rochester School of Medicine and Dentistry and Strong Memorial Hospital.
*Associate in Medicine.
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heating effects are brought about by electrical losses, such as dielectric hysteresis and eddy current losses, occurring in the part of the body under treatment.

The principal circuit is essentially that of a short wave radio transmitter. Two UX 852 radiotrons, rated at 75 watts each, are connected in a push-pull Hartley circuit. The tubes are energized by a 2,000-volt, full wave rectified but unfiltered, power pack. A tapped iron-core inductance is connected in series with the primary winding of the step-up transformer as a control of input voltage to the radiotrons. Two UX 866 mercury vapor tubes act as rectifiers for the high voltage. The filaments of all tubes are fed by a single separate filament transformer.

The wattmeter, the high tension voltmeter, and the filament voltmeter, and perhaps the radio frequency ammeters, are not absolutely essential but add greatly to the ease of the adjustments of the apparatus and are valuable for the collection of data. The plate milliammeter is quite necessary as an indicator for the correct operation of the machine. One terminal of a one-half watt neon lamp is attached to a low voltage point in the radio frequency circuit to act as an oscillation indicator. A choke coil is placed in the plate circuit of each radiotron to prevent the radio frequency currents from feeding back into the power pack. These may be wound in the laboratory and adjusted to the frequency range used by cut-and-try methods. The leads from the tapped primary choke coil go to the nine-point switch on the panel and also to a multipole socket, so that by means of a nine-point plug the machine may be operated by remote control at another rotary switch at the end of a small nine-wire cable.

The cabinet may be of any size and shape that allow free access to the apparatus and an easy application of the energy to the patient. Our cabinet was adapted from an old high frequency machine. It stands 130 cm. high, 45 cm. wide, and 40 cm. deep. The upper front of the cabinet holds a 1-cm. thick rubber panel, 60 cm. high and 40 cm. wide. Upon this panel are mounted all meters and controls.

The radio frequency voltages are led to the treatment plates by two jointed and extensible arms, the "shouder joints" of which are attached to the cabinet sides at a height of about 120 cm. from the floor. The "upper arm" consists of a 70-cm. length of 2.5-cm. brass tubing, with a 60-cm. length of smaller tubing which just slides easily inside of the larger one. A clamp at the end of the outside tubing holds the sliding portion in any desired position. The "elbow joint" is attached to the lower end of the sliding portion of the upper arm. There is a "forearm" consisting of an 8-mm. brass rod 35 cm. long, capable of complete rotation. This is insulated by hard rubber. The "wrist" consists of a 2.5-cm. ball-and-socket to which the treatment plate is attached. The usual treatment plates consist of circular aluminum discs, 1 mm. thick and 16 cm. in diameter, encased in hard rubber. These plates are interchangeable with a smaller elliptical pair, with a major and minor axis of 11 cm. and 7 cm., respectively. Because of the ample extensibility of the arms and the flexibility of adjustment, patients may be treated readily while lying in bed. The length of the arms may be varied from about 1 meter to 1 meter 60 centimeters. In application, the plates are adjusted one to each side of the part to be treated, with a space of from 2 to 4 cm. between the plates and the skin. This technic permits easy observation of the condition of the skin, which may be injured, as in ordinary diathermy, if too great power be used.

DISCUSSION

For low power work a single oscillator tube could be used. However, in such a case one of the treatment plates would be connected to the grid end of the helix, and, if much power were absorbed, the tube might cease to oscillate. In general, the push-pull arrangement is more satisfactory. Self-rectification is not advisable because the oscillator tubes become too hot. A frequency of about 10,000 kilocycles(30 meters) has been chosen because the tubes oscillate readily and deliver ample power at these frequencies. There is, naturally, a frequency shift when the length of the arms or the spacing of the treatment discs is altered, or when a patient is placed between the electrodes. This variation is of little consequence, since these relatively small changes of frequency at this wave length have little or no effect upon the heating produced. The arms are insulated as much as possible to avoid burns, which would occur if an exposed part of the high frequency circuit were touched.

Not a great deal is known about the temperature gradients occurring in tissue treated by this method, because of difficulties in using thermo-couples, etc., in a very high frequency field, but it is generally believed that they are quite similar to those found in ordinary diathermy. The clinical results do not seem essentially different.

CONCLUSIONS

An apparatus, capable of producing extremely high frequency oscillations, has been described, the electric field of which is utilized to produce heat in local parts of the body. The application of this energy to a patient is simpler than in the case of "electrode" diathermy, and is much less time-consuming.

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1. Carpenter, C. M., and Page, A. B.: The Production of Fever in Man by Short Radio Waves. Science, May 2, 1930, LXXI, No. 1844.
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Thirteenth Annual Convention

As the time for the thirteenth annual convention of the American Physiotherapy Association approaches, it may be well to emphasize a few of the more important points.

(1) June 13 to 16 next are the dates set aside for the convention.

(2) Hotel Cleveland, Cleveland, Ohio, will be the headquarters.

(3) The first business meeting is scheduled to begin promptly at nine A. M. (9 A. M.) June 13, 1934. (Delegates please take notice).

(4) Hotel reservations should be made early.

(5) The banquet will be informal.

The program is both varied and interesting. The speakers are men and women of ability and experience, and the subjects have been chosen with reference to the many branches of physical therapy and should prove of interest to the physical therapist, whatever her field of work may be.

Rainbow Hospital for Crippled Children, South Euclid, Ohio, which we will visit Thursday, June 14th, is a part of the Western Reserve University Hospitals. Doctor Maxwell Harpin, Chief Orthopedic Surgeon of the Hospital, will tell of the work being done among the children, and of his methods and treatments.

The convention committee has given much time and thought to make this a profitable convention, but its success depends largely upon the cooperation of the members of the American Physiotherapy Association.

Both chapter members and members at large have many problems which can be solved only by united efforts. Come to Cleveland for the Convention week! Come to talk over our problems and to profit by one another's experiences. Let us also find relaxation in the renewal of valuable friendships and in the making of new friends.

Cleveland and Cleveland Chapter welcome you.

PROGRAM

WEDNESDAY, JUNE 13TH

9:00 A. M. Business Meeting. Election of Officers.
12:00 M. Officers' Luncheon.
4:30 P. M. Tea.
8:00 P. M. Address of Welcome—Clarence H. Heyman, M. D., Secretary of the Academy of Medicine of Cleveland, Associate Orthopedic Surgeon. Lakeside and Mt. Sinai Hospitals, Cleveland.
"Arthritis as a General Medical Problem."—R. L. Haden, M. D., Chief of Medical Staff, Cleveland Clinic, Cleveland.
Address—Speaker to be announced.

THURSDAY, JUNE 14TH

9:30 A. M. Business Meeting.
2:30 P. M. Trip to Rainbow Hospital.
Address by Maxwell Harbin, M. D., Associate Professor of Orthopedic Surgery, Western Reserve Medical School, Cleveland.
6:30 P. M. Dinner at Mayfield Country Club.
8:00 P. M. Visit to Nela Park Laboratories, General Electric Company. Address by Dr. Matthew Luckiesh, Director of Lighting Research Laboratories, Nela Park, Cleveland.

FRIDAY, JUNE 15TH

9:30 A. M. Business Meeting.
2:00 P. M. "Low Back Disability, Its Etiology and Treatment."
Wallace S. Duncan, M. D., Department of Orthopedic Surgery, Cleveland Clinic, Cleveland.
Symposium on Postural Problems—Speakers to be announced.
"Health Examination in the Detroit Public School System."—Speaker to be announced.
7:30 P. M. Banquet at Hotel Cleveland (informal). "Developments in the Field of Fever Therapy," Frank H. Krusen, M. D., Director, Department of Physical Medicine, Temple University Hospital, Philadelphia.

SATURDAY, JUNE 16TH

9:00 A. M. Business Meeting.

IMPORTANT

Convention railroad rates will be a fare and a half for the round trip if applied for at the time of buying the ticket to Cleveland. The ticket must be signed by your local ticket agent and countersigned in Cleveland. Information as to where to get the ticket countersigned will be given at the convention. Do not fail to take advantage of the reduced rates.

REPORT OF NOMINATING COMMITTEE

The nominating committee has followed the customary system of rotation in preparing the ticket for the coming election of the Executive Committee. Two tickets have been prepared representing the western section of the country, one with a quorum in Northern, the other in Southern California. The committee wishes to remind you that nomination may also be presented from the floor on the first day of the convention.

The tickets submitted are as follows:

Ticket No. 1

President—Sarah U. Colby, Los Angeles, Cal.

First vice-president—Catherine Worthingham, San Jose, Cal.

Second vice-president—Lucile Grunewald, Pasadena, Cal.

Treasurer—Susan G. Roen, Los Angeles, Cal.

First member-at-large—Caroline M. Brown, New Haven, Conn.

Second member-at-large—Margaret Campbell, Chicago, Ill.

Ticket No. 2

President—Catherine Worthingham, San Jose, Cal.

First vice-president—Helen Landon, San Francisco, Cal.

Second vice-president—Sarah U. Colby, Los Angeles, Cal.

Treasurer—Ann Frolich, San Francisco, Cal.

First member-at-arge—Caroline M. Brown, New Haven, Conn.

Second member-at-large—Margaret Campbell, Chicago, Ill.

Gertrude Beard (Chairman)
Josephine Rathbone,
Hazel Furscott.

Concerning Films

Having made plans for the usual exhibit of photographs, braces, etc. for the A. M. A. meeting last June, Dr. Arthur T. Legg, who is the surgeon in charge of the Harvard Infantile Paralysis Commission Clinic, decided he would also like a moving picture film showing every activity taking place in the clinic. This at first was a staggering order and meant a great deal of detailed planning, but orders are orders and there was nothing to do but stagger on.

Our first few hundred feet were a great disappointment, our next attempt a bit more encouraging, and we finally succeeded in filming about 2,400 feet of clinic routine.

The film starts with the arrival of patients by Red Cross Motor Service; includes a complete muscle examination; physical therapy treatment, including baking, massage and exercises; patients being seen by the surgeons in charge; pool and respirator treatment.

For these pictures we use a negative film which seemed to us to be advantageous for this type of work. By using the negative film the shorts can be made in the order most convenient to you and, when editing, all splicings are on the negative film, leaving your finished, positive film smooth and with very few splicings which, needless to say, lessens the probability of the film parting company just at the most inopportune moment. As the negative film can be spliced and shifted endlessly, it allows you, by cutting out or shifting about, to arrange different films to fit different occasions. By starting with the positive film the number of duplications would be limited because before long there would be a great number of splicings in the finished picture, which would not only weaken the film but would also detract from its smoothness.

We are now starting to work on a film showing the various types of limps, pre-operative conditions and post-operative results, cases of recent onset just starting to walk, and noting their progress from time to time. This will take considerable time but we are hoping eventually to have a film that will prove interesting and helpful to all who are interested in physical therapy.

The Children's Hospital, Boston, Mass.

Exhibits

Because of an agreement with the Hotel Committee of the American Medical Association, we cannot have commercial exhibits in the Hotel Cleveland. All exhibits of that nature must be at the Public Auditorium to which we are to be given cards of admission.

Therefore, it behooves the chapters and members-at-large to make our non-commercial exhibits more numerous. We have already received word of the plans of several chapters, but we ought to have many more to make competition interesting. Cleveland will have several shows but will not compete. So *please* do your best.

Cleveland Chapter.

Chapter News Items

Chicago

Regular meeting—April 4, 1934. Dinner, business, program. Dr. Eugene McEnery, of Children's Memorial Hospital, gave talk on After-care of Empyema, and showed movies of the work done in the hospital. He stated that much has been done for the children with empyema, by proper exercise.

Delegates were chosen to represent the chapter at the convention. A special meeting will be held in May to discuss convention business, and to instruct the delegates.

Cleveland

The chapter is extremely busy with convention arrangements. Any chapter that has been hostess knows what that means!

Massachusetts

Regular meeting—April 10, 1934. Plans for annual meeting were discussed, and the exhibition to be sent was planned.

Program consisted of the showing of films describing the respiratory and circulatory systems.

Minnesota

Regular meeting—March 3, 1934. Dr. Evans gave a lecture on Landry's Paralysis, Berger's Disease, and the Steindler Shift used in scoliosis.

Regular meeting—April 7, 1934. Dr. Von der Weyer gave an illustrated talk on Progressive Muscular Distrophy. Dr. Williamson gave a talk on Fascial Transplant in Abdominal Paralysis.

Nominating committee was appointed for election of officers at the June meeting.

Michigan

Regular meeting was held on January 19, 1934.

The delegate to the 12th annual convention read her report.

Business—Chapter discussed the proposed revisions in the constitution with especial reference to the matter of limited membership and increase in dues.

Chapter voted: Approval of increase in dues to defray the extra expense of an executive secretary.

Chapter invited to the monthly staff meeting at the Children's Hospital of Michigan, February 22.

The orthopedic surgeons of the staff presented a most interesting and instructive program.

The following subjects were considered at the meeting:

(1). Decancellation of the Os Calcis, Astragalus and Cuboid in correction of congenital Talipes Equinovarus.—Dr. Frank Curtis.

(2). Observation on the Pathology of Bones occuring in children.

(3). Tendon Transplantation in Poliomyelitis.—Dr. Charles Peabody.

(4). Report on A Successfully Treated Case of Tuberculosis of the Knee.—Dr. Brochenshire.

(5). Congenital Anomalies of the Bones. — Dr. Fisher.

This program was well attended by the chapter members.

New York

March 20, 1934. Combined meeting New York and New Jersey Chapters held in Newark, N. J. Dr. G. G. Deaver and Dr. William Bierman joined us in an informal discussion on the "Future of the American Physiotherapy Association."

April 16, 1934. Combined meeting New York and New Jersey Chapters held in New York City. Miss Olga Lommer spoke to us of her work in the New York State Department of Physically Handicapped Childrn.

Pennsylvania

March meeting held at the Graduate Hospital of the University of Pennsylvania on March 2d. Round table discussion led by Marion Bryant, on the treatment of Subacromial Bursitis and Neuritis.

We have had these "Round Tables" at intervals lately, and they are well received by the members. We hope for more.

April meeting held at the Philadelphia County Medical Society, April 6th. Meeting was addressed by Dr. Frank Crispin, Executive Secretary of the Philadelphia County Medical Society and Business Editor of the Digest. His subject was Economics.

The monthly business meeting preceded the lecture. Delegates and alternates were appointed to attend the Convention.

Rhode Island

The chapter has been meeting with the Massachusetts group in order to have the advantage of a larger meeting and thus better lectures.

Southern California

Regular dinner meeting—April 4, 1934. Program: Prognosis of Untreated Scoliosis, lecture by Dr. P. S. Rissor, surgeon in New York Orthopaedic Hospital. Discussion followed.

Business: Sue Roen was elected to represent Chapter at the annual meeting of the Western Hospital Association at Sacramento, April 11, 1934.

At a special Executive meeting it was decided to insert in the Los Angeles County Medical Bulletin a half page announcement to bring the Physiotherapy Association to the attention of the Medical Society.

Texas

Regular meeting—April 10, 1934. Miss Myers, occupational therapist at Scottish Rite Hospital was speaker. There was also a social meeting. Irene Mae Lang is secretary pro tem.

Western New York

Dinner meeting—Oct. 28, 1933, Buffalo. Dr. R. Montfort Schley, Psychiatrist at Erie County Probation Department, spoke on Psychiatry.

Dinner meeting—Jan. 13, 1934, Rochester. Dr. E. T. Wentworth, Orthopedic surgeon, Rochester, spoke on Historical and Philosophical Considerations of Backache.

Annual meeting—April 14, 1934, Buffalo. Dr. Pio Blanco, Assistant Professor of Orthopedics, University of Buffalo Medical School, spoke on Causes and Differential Diagnosis of Backache.

New officers elected: President, Marion Davis; Secretary, Lelia Zernow, both of Rochester.

Wisconsin

On January 25th and 26th, the chapter attended the eighth annual meeting of The Wisconsin Association for the Disabled. The chapter was represented both on the program and in the audience.

Meeting of chapter—Jan. 27, 1934. Dr. Schaefer of Milwaukee, spoke on The Treatment of Burns.

(Wisconsin chapter has its own publication.)

We Are Sorry

In the New Jersey Chapter news of the March-April issue of The Physiotherapy Review, we stated that Dr. E. C. Stanaback was a pediatrist. He is a podiatrist.

ABSTRACTS

John S. Coulter, M. D.

Posture in Its Relation to Industrial Fatigue

J. R. Garner, Atlanta, Georgia, in M. J. & Rec., CXXXVIII:3:73, Aug. 2, 1933.

Phenomena of Fatigue

Fatigue is described as being a physiological condition of cells or organs which have undergone excessive activity with a resulting loss of power. More correctly speaking, however, fatigue should be considered from the dual viewpoint of the psychical and the physical. One who has for a considerable time been active, mentally or physically or both, develops a condition familiarly described as "feeling tired;" his sensation is one of weariness, a truly psychical phenomenon conveying no comprehension of any physical changes in the tissues of his body, although it is a fact that important material changes have taken place. Just what these changes are has given the physiologist no little concern, and even yet some of them are unknown.

That posture plays an important role in the production of fatigue will be readily conceded by all who give careful consideration to the subject. He who would perform his daily duties with the utmost of efficiency must be seated in a manner which will be as restful as possible by demanding a minimum of mental, nervous and muscular exertion for the maintenance. Such a position must conform to the anatomical requirements of the individual.

Effects of Improper Posture

Allusion has been made to the reciprocal and co-ordinate action of the vital organs of the body. This makes it practically impossible to enter into a detailed discussion of the effects of improper posture upon any one organ or set of organs without reference to interferences sustained in connection with other physiological functions.

Frequently long continued posture causes the bodies of the vertebrae to become changed in their shape and as a result the spine is curved to either the right or the left, forward or backward, as the case may be. This curving may take place in the region of either the neck, the chest, or the upper or lower portion of the abdomen. The curvature may be very slight or so exceedingly marked that the natural curvatures of the spine are completely obliterated and the distance between the upper and lower ends of the spinal column so shortened that approximately one-seventh of the length of the entire spine is lost. It is difficult to show anterior-posterior curvatures of the spine unless they are of a very marked degree. Curvatures of this class may be only transient in their character and the subject may straighten himself into a normal posture when not at work, but since many hours are daily spent in the performance of his labors very deleterious effects are produced upon the vital organs.

The interior of the body is divided into two main cavities, the upper known as the thoracic or chest cavity and the lower as the abdominal cavity. Separating these two chambers is a membrane composed of muscular and tendinous fibres which is attached irregularly around the lower part of the chest cavity and to the inner surface of the ribs and is arched upward so that its central portion is considerably above its borders. This membrane, known as the diaphragm, forms the base of the chest cavity which extends upward to the neck and is surrounded by the sternum in the front midline, the ribs from the breastbone outward, around the sides and then backward to the spine which is in the midline behind.

The act of respiration is an involuntary process in that it takes place without any thought being directed thereto and whether we be awake, asleep, or unconscious. It cannot be controlled for more than a few seconds by exertion of the will. The process consists of two entirely distinct functions, inspiration and expiration.

In inspiration an impulse originates in the respiratory center which is transmitted to the muscles lying between each pair of ribs and to other larger muscles which overlie the ribs, causing these muscles to contract and thereby to raise the ribs, thus increasing the size of the chest cavity. At the same time an impulse is sent to the diaphragm causing its muscular fibres to contract, drawing the dome downward toward the abdominal cavity and thus adding to the increased size of the chest capacity.

Since in a thoroughly slouched posture the cubical content of the chest is diminished by about one-seventh it is readily seen that there will be a deficiency of almost three cubic inches of air at each inspiration or of seventy-five thousand cubic inches in a twenty-four-hour period. Such a deficiency entails an enormous loss of oxygen, which element is vitally essential to both the prevention and cure of tuberculosis.

Not only does faulty respiration due to improper posture decrease the amount of available oxygen intake but in a like manner the carbon dioxide elimination is decreased and an accumulation of same takes place within the blood stream and becomes an important factor in the production of fatigue.

Having seen how fresh air taken into the lungs provides a supply of oxygen to the blood and how the expired air carries off carbon dioxide it is now appropriate to see how this oxygen is taken to the various tissues of the body, what it does and how it acts in the tissues, and how the product of tissue metabolism, carbon dioxide, is formed and delivered to the blood stream for transportation to the lungs where it is again exchanged for oxygen and the process repeated.

Improper Posture and Circulation

Before further following the blood stream, it will be best to offer a pen picture of the organ known as the heart and which is the pump upon which circulation depends.

That circulation is affected in a deleterious manner by an improper seating posture has been firmly established. When the chest is cramped the lungs and heart are not only pressed together but downward against the diaphragm and abdominal viscera. The direct pressure upon the heart associated with the reduction in the

available amount of air for blood purification, places a greater burden upon this organ.

The abdominal organs being forced downward are crowded upon themselves, and, in the female, upon pelvic viscera. Circulation in these organs is thus impeded with additional strain upon the heart.

As has been previously shown, the diaphragm is a musculofascial membrane which forms a dividing partition between the thoracic and abdominal cavities. When, as in a slouching posture, the anterior wall of the chest is flattened, the natural curve of the spine obliterated and an accentuated forward curve produced, the cubical volume of the chest diminished, and the lungs and heart forced downward upon the diaphragm, this organ loses its normal dome-shaped appearance and becomes more or less flattened out. In this process of flattening pressure is exerted from above down upon the abdominal viscera, all of which participate in a general ptosis or falling, press upon each other, force the abdomen outward so that it becomes prominent, retards circulation and markedly interferes with the function of the various organs. The effects produced upon these abdominal organs are varied.

Posture in Its Relation to Industrial Fatigue

J. R. Garner, Atlanta, Georgia, in M. J. & Rec., CXXXVIII:4:117, Aug. 16, 1933.

Effect of Posture Upon Abdominal Organs

The largest organ in the abdominal cavity, the liver, lies immediately under the diaphragm with which its upper surface is in close contact. The larger part of the organ lies to the right side of the body and normally the organ thins out to an edge which reaches down to just below the border of the last rib. A strong ligament (coronary) supports the liver from above and the anterior abdominal muscles hold it back against the shelving portion of the spine which has already been described. From the under surface of the liver spring the ducts and gallbladder which ultimately become a tube for conveying the bile into the proximal portion of the small intestines.

When the liver is forced downward its margin descends to where it is distinctly palpable on the right side of the body and in front and much below the rim of the chest cavity. The coronary ligament is put upon great tension and aids in drawing the diaphragm downward. The bloodvessels to and from the liver are put upon a stretch which naturally decreases their calibre, just as occurs with a rubber tube when it is put upon a stretch, and in this way circulation is impeded and normal function of the organ interfered with. In like manner the duct to the small intestines suffers a decrease in caliber and bile, essential to the process of intestinal digestion, is supplied in a diminished quantity. The condition which we commonly call biliousness is the result and may become chronic. Not only does intestinal digestion suffer but the condition is reflected in the skin by a condition familiar to all as jaundice.

The spleen lies to the left side in the upper abdomen and is affected in the same way as in the liver. Interference with the function of this organ results in an anemia—a condition familiar to all.

The kidneys lie embedded in a mass of fat, deep in the upper abdominal cavity, and to either side of the spinal column. Pressure from above, release of support afforded by the normally more or less flattened abdominal muscles, and obliteration of the spinal shelving, previously alluded to, cause a loosening of these organs from their attachments and what is termed a floating kidney.

Normally the colon begins in the lower right hand side of the abdominal cavity in that region familiar to all as being the location of the appendix. From here it ascends to the lower surface of the liver where it is rather firmly attached by dense ligaments and makes a turn toward the left side of the body, then across the upper abdomen with only a slight dip in the middle of what is called the transverse colon, and on reaching the left side of the upper abdomen is again firmly fixed by ligamentous attachments and turns downward to become the descending colon, terminating in the sigmoid.

When pressure is exerted from above, as when long continued improper posture is maintained, the uterus may be forced either straight downward, downward and forward, or downward and backward. It may even be kinked upon itself. In addition to the functional disturbances resultant upon these displacements, the subject will manifest general systemic symptoms such as headaches, nervousness, pains in the back and menstrual disturbances, and in addition thereto local disturbances due to pressure upon the bladder and rectum. If the bladder is pressed upon there will be frequent desire to empty it and even an inflammation of the organ may develop. When the uterus is retroverted and pressure exerted upon the rectum, constipation follows and may be very obstinate if the uterine displacement is sufficient to have caused the organ to become edematous—owing to circulatory disturbances—and to act as a valve when efforts at emptying the bowel are made.

The tubes and the ovaries suffer in a proportionate degree as does the uterus, owing to interference with circulation. Many a woman has suffered abdominal operations of a serious nature the cause of which can be directly traced to long continued improper posture.

I have endeavored to show that the conditions which follow improper posture and the fatigued condition resulting therefrom are not neuroses, as they have hitherto been described or classified, but are attributable directly to the ill effects of posture, and therefore, I prefer to speak of these postural pathological conditions as being either "posturosis" or "posturasthenia," the first referring to a state or condition for which posture is responsible, and the latter applying where posture is responsible for an exhaustion or fatigue.

Improper posture has long been a source of financial loss to industry. Those who have studied the subject are fully aware that correct posture increases man power by favoring full lung capacity breathing, oxidation of blood in minimum of time, free exhalation of carbon dioxide, unrestricted functioning of the alimentary system, lessened expenditure of nerve force, and reduction in muscular effort, and is conducive to health, efficiency and profits.

Correct posture means, for the employee, greater comfort, better health and less fatigue; for the employer, less loss of time, greater efficiency and increased financial returns.

Arthritis and Rheumatic States: Modern Therapy

Edward M. Lawler, M. D., Milwaukee, Wis. The Journal-Lancet, LIV:1:9, Jan. 1, 1934.

Prophylaxis in this revolutionary era of medicine—preventive medicine—is probably the most desirable form of treatment; but very unfortunately, has not, as yet, taken firm root in the minds of the general public.

The following points, however, experience teaches, are worthy of deep concern:

a. Foci of infection should be eradicated early, even during the acute stage, as Fordyce demonstrates when he reports good results with 40 per cent tonsillectomies in 531 cases regardless of how acute the condition was. Carious teeth, diseased tonsils, chronic prostatitis, sinusitis, salpingitis—these and other intoxicating conditions—must be dealt with early. Early is the keyword.

b. Dietary peculiarities must be altered. Excessive carbohydrate consumption should especially be avoided.

c. Colonic stasis and chronic constipation must receive the fullest attention. Mild laxatives and cautious diet are corrective of the condition.

d. Postural habits should be corrected.

e. Neurasthenics require re-education.

Rest is probably the most important form of arthritic therapy. Too often it is neglected. It is the *sine qua non* in the treatment of rheumatic fever and subacute rheumatism where cardiac injury is common. Here the absolute rest of thrombophlebitis is none too rigid; postural changes should be few and ice kept constantly over the heart. In the non-articular forms, especially the myalgias, and lumbago, spectacular results follow local rest through the agency of adhesive supports.

Few, if any, cases of arthritis can be expected to recover without some physical therapy. Pemberton indicates the desired effects: "To maintain and increase circulation in the joint; to correct physiologic processes in the soft tissues; and to compensate for lack of muscle activity following protracted disability. Thus we are able to restore much muscle tone and bulk to atrophic muscles." Massage should be employed in the neighborhood of, but never over, the site of joint involvement so that it does not add further injury to the already present inflammatory process. Gentle stroking, gentle compression, but never pinching, is the routine. With the exception of atrophic arthritis joint motion is as a rule contraindicated. Other contraindications of massage are fevers, myositis, phlebitis and other acute states. Kerr-Pringle, Laquer, and others recommend local heat through the agency of infrared lamps and Turkish, steam and mud baths; and thereto, no doubt, can be ascribed the success enjoyed by our prominent health spas and sanatoria.

Diet and elimination should be the early consideration of a physician who is confronted with a case of arthritis, most especially the rheumatisms.

As Pemberton, Fletcher, Coates and Snyder and Traeger with many others agree, probably the diet of choice is one with:

a. Normal protein intake if protein metabolism and kidney function are normal.

b. Normal fat intake to be increased in the atrophic form.

c. Low carbohydrate diet preferably, since Pemberton shows that there seems to be a delayed removal of ingested glucose from the blood stream. Carbohydrates to be increased in the debilitated.

d. Low caloric value.

e. Adequate amount of vitamins.

With a diet embracing the above principles and rich in fresh fruits, vegetables, milk, eggs and alkali substances, splendid results follow. A light diet, accompanied by large quantities of alkaline fluid is found to be desirable during the acute stages. Hall adds large doses of calcium lactate to the above diet in cases of atrophic arthritis.

In drug therapy the first consideration, from the standpoint of the patient, is relief from pain and discomfort that generally accompany the onset and rapid progress of rheumatoid involvements.

A. Analgesics: 1. Sodium Salicylate, by its antiquity, if nothing else, ranks first in the field of analgesics. In chronic cases, however, Sodium Salicylate has been found to be of diminished value.

2. Cincophen is perhaps the most prominent analgesic of the day, originally considered a specific for gout, but more recently found to be very effective in the subacute rheumatism and chronic joint affections. Mono-Iodo-Cincophen Compound was found most adaptable to the subacute forms, the non-articular types and hypertrophic arthritis.

3. Aspirin, Pyramidon, Phenacetin, Emperin Compound and the more potent analgesics—Amytol, Pantopon, Morphine, etc.—have a very restricted use in the more painful forms, their effect being only transitory.

B. Non-specific Drugs: In a series of 36 cases of various rheumatic states, injections of killed typhoid bacilli were made in ascending doses from fifty million to three hundred million at three-day intervals.

C. Specific Drugs: 1. Emetin, Ely and Exelby after isolating the entomoeba histolitica from the stools of patients afflicted with hypertrophic arthritis, recommend the use of emetin hydrochloride, 12 injections of one grain each, to be followed by emetin bismuth iodide, one to two grains daily for seven days.

2. Autogenous and Stock values.

a. The polyvalent streptococcus vaccine of Crowe is being used with a high percentage of improvement in the chronic forms throughout Europe.

b. In 1927 Small presented the streptococcus cardio-arthritis antigen and antiserum, now in much use throughout this country. In eight chronic cases studied in this series, splendid improvement of 60 per cent was observed.

D. Tonics and Stimulants: While treating the more or less localized process, systemic conditions must also be considered especially in cases of atrophic arthritis where debility is ever present. Arsenic, strychnine, iron, vitamins, calcium and others are all of great value in preserving the patient's vitality.

Surgery: The application of surgery in arthritis is still in the process of development. Sympathetic ganglionectomy as recommended by Rowntree and Addson and the plastic work of Jaroschy promise much, especially for the deformed patient afflicted with atrophic arthritis. Further work in this field is to be observed with much anticipation.

Conclusions

A series of 218 cases of arthritis and rheumatic states from the records of the Milwaukee County Hospital were studied with special reference to therapy; and literature reviewed. The etiology of the conditions remains in dispute; streptococci seem, however, intimately related to pathogenesis. With regard to therapy: After eradication of foci of infection, rest, physical therapy and diet must be in order. Sodium Salicylate remains the drug par excellence of rheumatic fever. Mono-Iodo-Cinchophen Compound appears to be the most useful analgesic in the subacute and chronic forms and no baneful effects were noted following its systematic use.

Treatment of Rheumatoid Arthritis With Hyperthermia Produced by a High Frequency Current

Edith E. Nichols, M. D., K. G. Hansson, M. D., and Wendell J. Stainsby, M. D., New York, N. Y. (From the New York Hospital and the Department of Medicine of Cornell University Medical College, New York.) In J. Bone & Joint Surg., XVI:i:69, January, 1934.

Methods

Apparatus.—A high frequency generator was used—one especially constructed to withstand long continued operation under a heavy load, and capable of delivering 3,500 to 5,000 milliamperes for at least one hour and a half. A large, perforated tinfoil electrode covered the back of the patient while similar ones were placed over the chest and abdomen.

Preparation of Patient.—On the day of the treatment the patient was given a light breakfast and was encouraged to take as much fluid as possible. The bowels and bladder were emptied. A hypodermic injection of 0.015 grams of morphine was given immediately prior to applying the current. The lips were covered with vaseline to prevent herpes.

Treatment. — For convenience each treatment usually began at ten o'clock in the morning, so that the whole procedure would be completed by late afternoon. The patient was placed on an ordinary hospital bed with rubber sheets covering the mattress. A bridge of incandescent lamps, called a "baker," was placed over the subject. Rubber sheets covered the bridge and the bed. Several heavy blankets were placed over the "baker" and around the neck of the patient, in order to prevent escape of heat. By this means, the individual was not encumbered by any weight on the body and was able to change position at will throughout the treatment.

The high frequency current and the "baker" at low heat were turned on simultaneously. The maximum current, 3,000 to 5,000 milliamperes, was reached in about five minutes, and maintained until the desired temperature was obtained. The current was usually turned off when the patient's temperature by mouth reached between 40 and 40.5 C., which took place in about one hour or one hour and a half. This degree of temperature was considered the highest that could be given with safety, as the fever curve tended to become slightly further elevated for a short period of time after the current had been turned off. In a few instances, the treatment had to be carried out at a slightly lower temperature because of the extreme restlessness of the patient. During the period of high fever, an electric blower maintained a circulation of warm air around the patient which considerably lessened the discomfort.

As soon as the desired temperature was reached, the high frequency machine was disconnected and the electrodes were removed. By means of the "baker," the temperature of the patient was maintained at a high level for several hours, after which it was gradually permitted to return to normal. An elevated temperature was usually sustained for a period of about five hours. When it became normal, the blankets and baker were removed and the patient, returning to the ward, was given the ordinary nursing care required for the safety and comfort of any fever patient.

Results of Treatment

Observations during treatment.—In spite of a generous use of sedatives, all of the patients suffered considerable discomfort from the high fever induced, and it was often difficult to persuade them to repeat the experience. During six of the treatments the patient became irrational at the height of the fever.

While the current was being applied, the skin became flushed and the body was covered with a profuse perspiration; greater mobility of the joints and freedom from pain were reported by all patients.

Observations after treatment.—With the first four treatments, the patients developed herpes around the mouth and nose. Prior to succeeding treatments vaseline was smeared generously over the lower part of the face, and the incidence of herpes was greatly diminished. One patient developed herpes of the retina which, however, gradually but completely disappeared. In two instances, nausea and vomiting set in immediately following the treatment. This continued for twenty-four hours in one case, but lasted a few hours only in the other. In a number of instances, a mild, first degree skin burn was noted, at the site of contact of the electrodes with the body. This usually cleared up in about twenty-four to forty-eight hours. In two instances more severe burns occurred, with ulceration and sloughing of tissue. In one case the breasts were involved; in the other, the abdomen. These burns required approximately three weeks to heal completely. There were no deaths, no complications other than those reported, and no apparent permanent injuries.

Summary and Conclusions

Twelve patients with rheumatoid arthritis were treated with hyperthermia produced by a high frequency current. The number of treatments for each patient varied from one to five. Although considerable care was exercised to lessen the discomfort arising from the treatment, each patient considered the experience a trying ordeal. No serious complications resulted from the treatment. While, in most instances, temporary relief of symptoms was noted, there was no evidence that any lasting benefit was derived from this form of therapy. The results were so discouraging that we felt we were not justified in continuing this form of treatment in rheumatoid arthritis.

Conclusions

No lasting improvement was demonstrated in our series of cases of rheumatoid arthritis treated by hyperthermia produced by a high frequency current.

The Initial Drop in Temperature of the Blood in a Superficial Vein of the Forearm Following a Stimulus of Hot Water to the Contralateral Extremity

C. Korth and S. H. Proger (from the Medical Clinic of the Boston Dispensary and the Department of Medicine, Tufts Medical School; in The Am. J. Physiol., CVII:1:55, Jan. 1, 1934.)

With a constant external temperature and without muscular activity, changes in the temperature of the blood in the superficial vein will depend upon the amount and velocity of blood flow. If the volume of blood is diminished, the surface cooling will be greater and the temperature of the blood in the superficial vein will therefore be lowered. On the contrary, if the blood volume is increased, the reverse will be true. Also, more rapidly circulating blood will be cooled less quickly and the temperature of blood in the superficial vein may in this manner be raised. Since a more rapid blood flow predicates a greater minute volume of blood, it may,

therefore, be said in general that a measure of the blood temperature in an extremity is, in fact, a measure of its blood volume, at least under the conditions of the experiments here presented. Stewart (Harvey Lectures 1912-1913, 86) employed this principle in the measure of the blood volume of the hand by means of his calorimetric method. The advantage of direct measurement of the blood temperature by means of a thermo-electric couple over the calorimetric methods lies in the fact that fluctuations are more quickly discernible.

Summary and Conclusions

Repeated experiments were performed on eight subjects as follows: With a thermo-couple, the temperature of the blood was measured in a superficial vein of the left forearm while the opposite hand was immersed in a warm water bath at 45 degrees. The room temperature was between 15 and 18 degrees.

In five of the eight subjects there was a definite drop in the blood temperature after a latent period of several minutes, followed by a marked rise in temperature.

Simultaneous with this drop in temperature in the forearm there was an elevation of skin temperature over the trunk and face.

The preliminary drop in temperature of the blood in the superficial vein of the forearm is due to a local decrease in blood volume. This local decrease, in turn, is thought to be due to generalized increased vascularity over the trunk and face. It is assumed that the cooling following the loss of blood in the forearm might produce vaso-constriction.

Evidence is presented which indicates that under certain conditions vaso-contriction and vaso-dilatation may occur simultaneously in different parts of the skin surface following a single vaso-motor stimulus.

Hyperpyrexia Baths and Epilepsy

The chemical and physiologic responses of the body to hyperpyrexia baths, and their significance in the epileptic syndrome. Helen Hopkins, M. D., Los Angeles, in California & West. Med., XXXIX:6 :364, December, 1933.

Symptomatology of Hyperpyrexia Baths

A definite train of subjective and objective symptoms develops upon exposure of the human body to high temperature environments. These have been studied and well described by a group of careful observers. The appearance of frank tetany in a certain number of subjects, and of convulsive reactions in many cases of epilepsy and general paresis, has led to a search for a possible explanation of these phenomena. Other neurological findings have been elicited under the influence of hyperpyrexia baths, to the end that localization of central nervous system pathology has been accomplished in a few cases. Temporary psychic disturbances have also been observed. Currie described the abnormal symptomatology developed in baths of 105 degrees F. in 1797, and advised strongly against temperature above 100 degrees F.

With these preliminary observations in mind, thirty-six hyperpyrexia baths were investigated in a group of well defined and pronounced cases of the epileptic syndrome. Fifteen per cent of the baths induced typical major seizures, all appearing between twenty and forty-five minutes after the beginning of the bath, during the period of maximum chemical and physiologic change.

Physiologic Changes

The physiologic responses to hyperpyrexia baths are chiefly of respiratory and cardiovascular nature. Under ordinary environmental conditions, the demands of the human organism for cooling are compensated for by pulmonary hyperventilation, augmented elimination of water from the skin (loss of heat by evaporation), and direct radiation and conduction of heat from the body surface. Under the conditions of the bath, heat cannot be dissipated at the surface; and since the pulmonary avenue of escape of heat is inadequate, the body temperature rises in direct proportion to the temperature of the bath. The baths of the present series were conducted with uniform technic, and resulted in a mouth temperature of 105 to 106 degrees F. in thirty to forty-five minutes.

During the pulmonary hyperventilation of the bath, excessive amounts of carbon dioxide are lost in the expired air, lowering the carbonic acid content of the blood and terminating in a pronounced disturbance in acid base equilibrium. Alkalosis of severe grade is developed. As the bath is continued the level of carbon dioxide in the blood falls so low that the respiratory center is only periodically stimulated, and a Cheyne-Stokes type of breathing makes its appearance.

With exposure of the body to external heat, extensive peripheral vasodilatation is reflexly developed. The sudden widening of the vascular bed and the consequent fall in peripheral resistance, as observed in greatly lowered diastolic pressure values, calls for cardiac and blood volume adjustments to insure the continuance of adequate circulation of the blood. The rate and force of the heart beat are greatly increased, as reflected in the rapidly rising pulse rate and systolic pressure level. Blood volume increases by hemodilution of ten per cent for the dual purpose of filling the greatly dilated vascular bed, and of bringing a greater volume of blood to the surface of the body for dissipation of heat through the evaporation of sweat, as well as for direct radiation and conduction of heat from the surface.

In addition to these changes, Mehrtens and Allred have studied the intracranial pressure relationships.

Summary

The effect of hyperpyrexia baths upon the human organism, then, is one of augmentation of cellular excitability developed upon the basis of alterations in chemical and physiologic equilibrium. The present discussion has been confined to these changes as they concern the functional activity of the nervous system. By the use of this measure, latent neurologic and psychic abnormalities have been made apparent.

The experimental use of hyperpyrexia baths in the study of convulsive disorders has been of practical value in the localization of the central pathology, and has shifted some of the clinically functional cases into the organic group. One outstanding example comes to mind of an adolescent girl who, after investigating the nature of her symptoms and in the absence of positive neurologic findings, was classified as a functional case. A major convulsive seizure was elicited by the bath and unquestionable unilateral localizing signs were brought out. Subsequent encephalographic study after lumbar air injection confirmed the localization and revealed an extensive unilateral atrophy of the cerebral cortex.

In view of the percentage (15 per cent) of hyperpyrexia baths resulting in convulsive reactions in well-known cases of the epileptic syndrome, it should be borne in mind that failure to induce a seizure does not

rule out the possibility of epilepsy, while positive results are not only of diagnostic value, but frequently lead to the localization of the lesion.

Because of the property possessed by high temperature baths of augmenting nervous excitability, and of transporting latent into manifest neurologic signs, this experimental method may be offered for the study and diagnosis of a wide variety of disorders of the nervous system. The experimental investigation of the changes effected within the body by hyperpyrexia baths should lead to a better understanding of excitability, and to the discovery of the mechanism for the beneficial influence of fever therapy upon specific disease conditions.

Modifying Rest With Exercise in Pulmonary Tuberculosis

Indications and Methods. Elliott Smart, Olive View, Cal., in Medical J. & Rec., CXXXVIII:8:267, October 18, 1933.

Of the greatest importance is individualization. Infectious diseases, as they affect different people, produce a varying picture. While the same disease is produced by the same microorganism, yet identical conditions, whether in pathology, symptomatology or in ultimate results, will never be found.

Periods of Treatment

In the first period the disease is active, progressive, acute or subacute; where no modification of rest with exercise can be tolerated, or where certain diversion activities involving the cultural muscles may be indulged. The lesions are soft, caseous, with areas of haziness and new infiltrations, or old areas with evidence of perifocal reaction. Usually the shortest period of treatment is a few weeks to a few months.

In the second period the disease is quiescent but still definitely lacking in adequate defence, when graduated exercises involving the larger skeletal muscles may be initiated. The lesions are improved; there are no constitutional symptoms; expectoration and bacilli may or may not be present; physical signs and roentgen findings are those of stationary or retrogressive lesions, and are fibrocaseous, with the haziness and new infiltrations absorbed. Increasing fibrosis is present with diminution of perifocal reactions and cavity formations.

The third period is that in which the disease is apparently arrested, when adequate physiological balance and defence have been reached. All constitutional symptoms and expectoration with bacilli have been absent for a period of three months, the lesions show advanced signs of healing, roentgen findings are compatible with the physical signs, and graduated occupational shop work and utilizable employment may be continued toward fitness for self-support.

The fourth period is that in which the disease is arrested. All constitutional symptoms and expectoration with bacilli have been absent for a period of six months, the physical signs are those of a healed lesion, roentgen findings are compatible with the physical signs, graduated occupational shop work and utilizable employment may be continued in established colonies, and hours of work may be gradually increased from part day to a full day's work.

The fifth period is that in which the disease is apparently cured. All constitutional symptoms and expectoration with bacilli have been absent for a period of two years under ordinary conditions of life. This period involves the establishment of industrial colonies and rehabilitation training activities.

Rest is to our tuberculosis patients as oil is to the waves of the storm lashed sea. It not only keeps them flat but is a compelling force for quietness, bodily and mental relaxation. However, in order to maintain the patient's morale, we frequently have to resort to psychic and physical diversions. Therefore, rest treatment without the consideration of exercise would be incomplete.

Importance of Proper Exercise

Control of exercise is one of the most important factors in the treatment of pulmonary tuberculosis, in order to control the inoculation. It must be recalled that more tuberculosis patients are killed from over-exercise than are ever hurt by too much rest, and while rest is essential during the acute and subacute periods, exercise is just as important when the proper time comes.

Exercises should, under no circumstances, cause toxic symptoms, shortness of breath or fatigue from which the patient does not recover after a few minutes rest.

In the first period, when the patient is febrile, acutely or subacutely ill, he should be made a bed patient, with absolute rest in bed, modification being an economic problem rather than a therapeutic one.

Individually, a number of patients may have a tendency to develop mental unrest, become restless, tense, their nerves taut, and develop an anxiety neurosis. Rest must be modified in accordance with their needs, and should furnish a safety valve for the release of energy in excess of a physiological balance. With this aim in view diversions may be prescribed, the head of the bed raised increasingly and for lengthened intervals until the patient assumes a semirecumbent position.

When a patient is confined to his bed for a long period he is prone to lose strength, the skin will become dry, scaly and sallow and there is a loss of muscular tone. Therefore, after bed rest for several weeks, depending on the individual case and the climate, the patient is put in a sun suit and exposed to the air, but not the sun. The light and air striking the surface of the body increase the peripheral circulation, acting, we are told by Mayer, as passive massage. The skin becomes smooth, clear, velvety and the underlying muscle tone firmer.

As the patient becomes atoxic, thought is given to modification of bed rest by use of the cultural muscles; the laryngeal, the lingual, the facial and the smaller skeletal muscles may be included in this group, also those of the fingers, hands and possibly the forearms. The individual patient is at this time possibly allowed to exercise groups of muscles in the order mentioned; or perhaps move from a private to an open ward with neighbors and allowed to talk with restrictions as to topics and amount.

Temperature and pulse are not alone a sufficient consideration on which to base extended exercise. The cough, the sputum, the character of the sputum, the presence of elastic fibres, bacilli, blood sedimentation time, physical findings, rales, quantity and quality, and roentgenographs, showing changes in infiltration, fibrosis and cavity formation, all have to be observed carefully.

Occupational Therapy

If no contraindications arise, the patient is allowed light occupational therapy.

A division of occupational therapy crafts is made into groups A, B, C, and D, with respect to the amount

of effort or energy required of the patient in their performance or accomplishment.

Group A represents those requiring a minimal of muscular exertion and initiates occupational therapy activities to the bed patient. Under this heading we find light crafts, such as painting cards or small objects.

Group B represents medium crafts suitable for semi-bed patients able to do heavier work than in Group A, as soap carving, chip carving, ribbon flower making.

Groups C and D represent shop craft requiring exercise of all skeletal muscles and suitable for the semi-ambulatory or ambulatory patient and include all the crafts in Groups A and B and in addition Group C, which consists of crafts, block printing, batik, pottery, basketry, caning, toys (wood), hooked rugs (small), electric machine sewing.

Group D consists of the heavy crafts for the ambulatory patient. Carpentry, large loom weaving, heavy basketry, metal work (jewelry), book binding, hooked rugs (large).

When a patient has reached a maximum of four shop hours daily he is ready for discharge from a sanitarium, say to a colony or other suitable environment.

Peripheral Nerve Lesions, Their Treatment and Prognosis

B. Bruce Newbarr, M. D., and Frederick D. Newbarr, M. D., Los Angeles, Cal., in West. J. of S. O. & G., 41:11:628, November, 1933. (Read before the Industrial Surgical Section, Los Angeles County Medical Association, May 11, 1933).

Injuries to nerve trunks are seldom primary; however, any nerve may be affected by external violence. In our experience the nerve injuries occur chiefly to the musculospiral, ulnar, medium, sciatic, external popliteal, and internal popliteal nerves. This paper is based upon 309 cases of the various nerve involvements and seems to justify the conclusion that the greatest number of nerve injuries occur in the upper extremities. In our series the distribution was as follows: brachial plexus 6, musculospiral 96; median 54; ulnar 51; median and ulnar 13; musculocutaneous 7; circumflex 1; sciatic 27; anterior crural 7; internal popliteal 13; external popliteal 29; anterior tibial 2; lumbar plexus 3; making a total of 309.

No decision upon a nerve lesion should be made until electrical examinations have been performed. An electrodiagnosis is obtained through two examinations, one by faradic current and the other by galvanic current. In making electrical examinations, each muscle group and each muscle of the group should be tested individually. A positive reaction to faradism is regarded as a contraindication to operation, but failure to respond gives no definite information because voluntary movement may return after nerve injury and before faradic response appears. In the majority of cases with division of the nerve, reversal of polarity is present and is an indication for operation. The presence of a degree of voluntary power in some individual muscles of a group supplied by a damaged nerve is no sure indication that the paralyzed muscles will recover without the assistance of an operation. Careful electrical examinations are very important as they verify the previous conclusions and tend to prevent the possibility of error. When both organic and functional lesions exist, one can determine the extent of each lesion by the electrical examination.

Sensory examinations are best accomplished by repeated examinations, because the procedure is very tiring. The examination must include tests for superficial and deep sensation. The method of examination for superficial sensation includes tests of sensibility to touch and sensibility to pain. The tactile examination is made with very light strokes, being careful not to arouse the deep sensibilities. This can be done with a piece of cotton, wool, or small camel's hair brush. The sensibility to pain can be tested with a pin, but where different doctors make the same examinations the esthesiometer, which applies a constant weight, is superior. Deep sensibility is tested by the use of the head of a pin, by position of joints on passive motion, and also by the algesiometer, which has a definite weight pressure. All findings should be carefully charted on the diagrams representing the parts under examination.

Too much importance cannot be placed upon the proper application of correct splinting in nerve injuries. This should be attended to immediately as only harm can follow neglect of this important treatment.

Massage, hydrotherapy, electrotherapy, and proper movements should also begin at this time. The parts supplied by a wounded nerve must be restored and kept ready for the nerve impulses which some day will seek their normal course. Careful attention should be given to the joints. It is remarkable how quickly the fingers, for example, become so stiff that forced movement causes severe pain. Each day and many times a day all the paralyzed parts must be freely moved to their full range, the most perfect nerve healing is robbed of its value if through long disuse the muscles have lost their power to respond to the returning nerve impulses or the joints have become so ankylosed that even passive movement cannot fully bend them. If we do not carry out this procedure, the most perfect nerve recovery will be robbed of its efficiency due to the inability of the surrounding tissues to function normally.

Regarding prognosis, it has been our experience that the musculospiral nerve heads the list of recoveries whether judged neurologically or functionally. The results in this nerve showed almost perfect restoration of function. In the ulnar nerve our results have been neurologically imperfect but functionally good. Complete restoration of function in the ulnar intrinsic muscles of the hand was not good, while the coarse movements were good and the injured man was able to carry on duties of manual labor. In the median nerve the results have been disappointing owing to the extreme functional disability caused by the helpless index fingers and the failure of recovery of sensation in this part. Inasmuch as this nerve supplies the working part of the hand, the loss is great and is the cause of considerable disability. The sciatic nerve recoveries have been fairly good; the external popliteal nerve shows many complete functional recoveries, but from a neurological standpoint they cannot be considered good; however, from a point of economic function they do very well, especially with the assistance of some light efficient ambulatory splint. Recovery in the internal popliteal nerve, neurologically and functionally, has not been good. No case has shown recovery of the intrinsic muscles of the foot. The sensory restoration was exceedingly defective and this lack of sensation caused traumatic ulcerations in the foot in many cases.

In all of our recoveries the voluntary motion returned before the response to the faradic current.

Fever Therapy in Paresis

James King, M. D., Radford, Va., in Va. Med. Mo., 60:12:720, March 1934. (Read before the Southwestern Virginia Medical Society at Wytheville, Va., Sept. 15, 1933.)

For many reasons it is difficult to give satisfactory presentation of the results which have been obtained by malaria. Favorable reaction depends largely upon the degree to which the syphilitic process has advanced. A recent report in the J. A. M. A. by O'Leary and Welch (101:7:301) show that in 186 cases of advanced dementia paralytica, excellent results were obtained in 35 per cent and fair results in another 35 per cent. They report 249 cases of "early paresis," with excellent results obtained in 46 per cent of the cases and fair results in 35 per cent.

The average mortality during malarial treatment varies from five to ten per cent. This rather high death rate would not in itself be unfavorable to the continued use of malaria in view of the statistics of 1915, but there are many other objections. Malaria is a debilitating disease. The blood cells and blood pressure are markedly lowered. The patient loses weight rapidly and often there is great risk. The organism is not always available. The patient has to be hospitalized. Ten per cent of paretics have an immunity to malaria. The disease cannot always be terminated when desired. One is not always sure that the proper strain is being injected. There is no means of controlling the number of chills or the height to which the fever rises. To overcome these objections other methods of fever production began to appear.

Fever may be produced in man by external heat, such as the hot bath, electric blanket or electric light cabinet; or by penetrating heating agents, as diathermy and the radiotherm. Of the devices thus far brought into use diathermy has been the most satisfactory.

Successful treatment with diathermy depends on certain mechanical factors necessary to produce elevation of temperature, maintain it, and prevent burns to the patient. The prime requisites are properly constructed electrodes, a machine powerful enough to give sufficient energy, and proper insulation of the patient.

The fever curve to be desired is that of a long sustained temperature with a high plateau ranging above 103.5 degrees for eight hours.

It has been experimentally shown that temperatures of 105.8 degrees are definitely spirocheticidal. Organisms living in tissues are killed outright by this amount of heat in two hours. In producing our fever, therefore, we seek to maintain the temperature above 105.8 degrees for four hours of the eight-hour period.

Temperature ranges from 107 degrees and over may seem rather dangerous to some of you. Some workers with diathermy are using temperatures of 107 degrees and 108 degrees sustained over several hours. Some state that they have maintained a temperature of 108.5 degrees in robust individuals for four hours. Such artificially induced fevers are tolerated well by the patient for the reason that the temperature is not the same process as that noted in fevers accompanying pathological conditions.

Neymann, who has done most of the pioneer work with diathermy in paresis, recommends a minimum of twenty treatments. He finds that most remissions occur after the fifteenth treatment. A case is not abandoned until fifty treatments have been given. The treatments may be given at intervals of two or three days.

There are few contra-indications. Aged, debilitated, cardiovascular and renal cases should be closely watched during the treatment. These conditions are distinct contra-indications to any other form of fever therapy, since the height of the fever cannot be controlled. Perfect control is the great advantage of diathermy over other methods.

Four hundred and forty-six cases of paresis have been reported in the literature as treated by diathermy. Summarizing all of these, 133, or 30 per cent, have been reported in an absolute state of remission; 153, or 35 per cent, have recovered sufficiently to be discharged from hospitals. These results, as you see, are practically identical with those obtained by the malarial method. As more knowledge is gained in the use of diathermy, it is not at all unlikely that the method will show more favorable results than with malaria.

We have used practically all forms of fever at St. Albans with not sufficient cases to report by percentages. At the present time, after establishing the diagnosis by the clinical picture, blood and spinal Wassermanns and the colloidal gold test, we institute a regime as follows:

The patient is first given a short course of neoarsphenamine, if no arsenicals have been given. This is intended to improve any systemic syphilitic process that may exist. Formerly, we gave tryparsamide, grams 2.0, weekly for ten weeks, but at the present time we proceed immediately to the production of fever. The hazards of malaria previously made this the last part of the treatment, but the comparative safety of diathermy has led us to institute this form of therapy without delay.

The Clover Leaf Sling in Paralysis of the Serratus Magnus

H. O. Foucar, B. A., M. D., (Chief of Surgery, St. Joseph's Hospital, London, Ontario; in British M. J., No. 3801, p. 865, Nov. 11, 1933.

The principle of rest followed by graduated exercises, starting from the zero point and increasing slowly until the muscle moves through its maximum range, has been ably put forth by Mackenzie as the rational form of therapy for paralyzed muscles. In the treatment of any paralyzed muscle, then, our primary object is to ascertain the position of physiological rest and to maintain it.

Anatomy

With the need for increased function of the arm as we ascend the animal scale, the scapula loses its connection with the skull, thus becoming mobile, necessitating a further differentiation and rearrangement of the cervical muscles to control its movement. Complete usefulness of the arm depends not only on the proper function of the muscles inserted into the humerus and acting on the shoulder-joint proper, but also on the muscles arising from the trunk and inserted into the scapula, either stabilizing it or moving it through the acromio-clavicular articulations. This applies particularly to the ability to raise the arm above the level of the shoulder. To facilitate this the superficial shoulder-girdle muscles—the sterno-mastoid and the trapezius—have been evolved from the visceral musculature of the gills and from the metametric musculature of the second, third and fourth cervical seguments, while the deeper shoulder-girdle group—the levator scapulae, the two rhomboidei, and the serratus magnus—has been derived from the ventrolateral division of the lower fifth and sixth myotomes. The serratus magnus has moved its point of origin extensively, finally dissociating itself completely from the levator scapulae, but carrying with

it its original nerve supply from the cervical region. The other shoulder muscles arise in the blastema of the limb bud, the pectoral group spreading out over the trunk anteriorly and the latissimus dorsi posteriorly, the teres major becoming separated from the latter, to be attached to the lateral border of the scapula. The deltoid and its offshoot, the teres minor, with the supra- and infraspinati, develop together, while the subscapularis from the first prefers its own company.

The two important muscles controlling the scapula, therefore, are the trapezius and the serratus magnus, and isolated paralysis of these muscles may occur. It is doubtful whether isolated lesions of the two rhomboidei or the levator scapulae are often recognized clinically. The serratus magnus springs from the lateral chest wall and is inserted into the undersurface of the vertebral border of the scapula, and its function is to pull the scapula forwards over the lateral chest wall and also to keep this bone close to the trunk, although Frazer states that the upper fibers of the latissimus dorsi are responsible for this. The nerve supply is from the fifth, sixth and seventh cervical roots. This nerve does not enter into the formation of the brachial plexus; thus, in injury to the superior trunk, the serratus magnus may escape, except in avulsion of the cervical roots. Its upper two roots pierce the scalenus medius, while the lower one passes in front of it. They unite as the long thoracic nerve and pass out of the posterior triangle of the neck on to the outer surface of the serratus magnus behind the axillary vessels and nerves, occupying a position on the inner wall of the axilla and the lateral chest wall.

The position of physiological rest for the serratus magnus is assumed when the hand of the affected side is carried across the chest and placed on the opposite shoulder. To maintain this position Mackenzie states that the "collar and cuff" sling is satisfactory, and he shows illustrations of good results following its use. It would seem, however, that the affected shoulder is not sufficiently fixed, but may swing backwards either by gravity when the patient lies down or by the voluntary action of the rhomboidei and the trapezius. To overcome this difficulty H. Houldsworth, orthopaedic technician for Victoria Hospital, designed for the second patient a sling which uses the opposite shoulder as a fixed point, thereby maintaining the serratus magnus at rest at all times.

Backache

W. Barnett Owen, M. D., Louisville, Ky., in Southern M. J., XXVII:1:40, January, 1934.

Next to constipation, backache is the most common ailment of mankind. A great deal has been written and said about backache during the past few years, due, partly, to the increasing number of industrial back injuries and partly to the fact that many cases of backache are exceedingly difficult to diagnose.

The diagnosis of backache is made from the (1) history, (2) physical examination and (3) carefully made and interpreted roentgenograms.

The symptom, backache, is so variable and inclusive that we may consider it from six standpoints, namely: orthopedic, medical, gynecological, urological, neurological, rectal.

Osteo-arthritis is the most common cause of backache in people of middle age or beyond. Goldthwaite did a monumental work on the lower spine and the sacro-iliac joints and is responsible for much of our interest and understanding of low backache. The patient usually gives the history of chronic discomfort in the lower back, and suddenly is seized with a sharp disabling pain after severe exertion. An x-ray is taken which shows lipping of the bodies of the vertebrae and articular facets, which have existed for a long time and probably had their origin from an old infected focus, in perhaps the gastro-intestinal tract, teeth, tonsils, sinuses, gall-bladder, prostate or seminal vessels.

Ryerson says these cases can often be differentiated by the fact that the pain and stiffness complained of is usually worse in the morning and disappears during the day. He thinks certain poisons are eliminated which have been stored up during rest at night. He recommends removal of foci and a fusion operation in selected cases, especially if the lumbo-sacral joint is chiefly involved and a lumbar lordosis co-exists.

I feel that, particularly in the milder cases, heat, massage and manipulation, followed by rest and support are sufficient. When palliative measures fail, the more radical measures should be considered. Of course, when nature produces a spontaneous fusion all pain ceases. Thorough elimination by the bowels and kidneys and attention to the diet and metabolic rate are important factors.

Tuberculosis is very largely a disease of childhood, though no age is exempt. The history is of gradual onset, pain, stiffness, weakness, awkwardness and later deformity. The x-ray appearance, of course, is quite characteristic in advanced cases. The x-ray is frequently negative very early in the disease, which is misleading to many.

Syphilis of the spine is so extremely rare that I shall not do more than mention it.

"Typhoid spine" does occur and I feel that the treatment, like that of spinal osteomyelitis, should be conservative, consisting of rest on a convex frame, full diet, sunshine and a brace or jacket when the process has been arrested enough to allow the patient to be up and around.

Under traume as a cause of backache I shall discuss (1) synovitis, (2) fractures of the vertebrae and (3) strains.

Poor posture is a very frequent cause of painful backs of a mild degree. The usual type of deformity is the round shoulder hollow back, frequently the result of poor posture during childhood and adolescence. The feet should always be examined, as weak, pronated feet may be the seat of the trouble.

Vertebral epiphysitis is not infrequently a cause of this type of deformity and careful lateral films should always be made to rule it out. These cases may be prevented and relieved by rest, support and constitutional treatment.

From the medical aspect the causes are legion. The familiar backache of the onset of the acute infectious diseases, typhoid fever, malaria, and influenza is sometimes severe, but usually transient and disappears after a few days.

The urologists attribute many cases of low back pain to diseases of the prostate, bladder and kidneys. The agonizing backache of kidney or ureteral stone is a common symptom of this disorder.

The Effect of Photothermal Radiations Upon Cutaneous and Subcutaneous Temperatures

Preliminary Report

From the Departments of Physical Therapy, College of Physicians and Surgeons, Columbia University and Beth Israel Hospital, New York City. Read at the twelfth annual session of the American Congress of Physical Therapy, Chicago, Sept. 12, 1933.

William Bierman, M. D., Arch. Physical Therapy, XIV:12:717, December, 1933.

Sonne noted that during the applications of incandescent radiation of maximum tolerance, the surface temperature of the skin rose to 43.8 C., while the subdermal temperature at a depth of 0.5 cm. was 47.7 C. On application of infrared radiation he observed temperature differences of 45.5 C. on the skin surface, and 41.7 C. at the depth of 0.5 cm.

Loewy and Dorno reported skin surface temperatures of 41 to 44 C. during irradiation with long infrared rays, while the temperature at a depth of from 10 to 25 mm. was about 38 C. They found that the short infrared rays and visible rays of sunlight caused a temperature of 38 C. on the skin surface, and 40 C. at a distance of 25 mm. beneath the surface.

Studies of Bachem and Reed show that a considerable percentage of the radiation in the visible and near infrared regions of the spectrum penetrate through the skin and into the subcutaneous areas, while radiation of the far infrared spectrum has practically no penetration. Most of the near infrared radiation was absorbed in the upper layers of the skin while most of the visible radiation was absorbed in the lower layers.

As the structure of the skin varies in different parts of the body, so does its tolerance to heat. We found that the skin of the forehead as well as that covering the hands and feet, was able to endure the greatest amount of heat. These same areas were the ones revealing the lowest skin surface temperatures when the point of maximum heat tolerance was reached. The heating source was a 260 watt carbon-filament lamp. This lamp was held fixed at a distance of eighteen inches from the skin surface during the experiment. The only definitely variable factor was the length of time the lamp was permitted to radiate heat to the subject, the latter determining his own tolerance. The cutaneous temperatures were measured by means of a skin surface thermocouple, while the lamp was radiating.

By means of thermocouples we determined the temperatures developed on the skin surface and subcutaneously when different types of heating lamps were used to create heat to the limit of comfortable tolerance.

We determined the temperatures created in the region of the thigh in one normal individual by means of a 1500-watt tungsten filament lamp and by means of an infrared lamp. The highest skin surface temperature observed at the maximum tolerance was about 42 C. in both instances. The subcutaneous temperature produced by the tungsten filament lamp was, however, about 2 degrees C. higher than that developed by the infrared lamp.

The temperatures produced in the external aspect of the forearm of another subject enabled us to compare the results obtained from the use of a blue bulb 1500-watt tungsten filament lamp; a 260-watt carbon filament lamp; an infrared lamp in which the radiating source was a metallic ring; and an electric bathroom heater. The greatest subcutaneous temperature was caused by the 260-watt carbon filament lamp, 40.9 C., and the next by the blue bulb tungsten filament lamp, 40.5 C.; the third by the bathroom heater, 39.2 C., and the lowest by the infrared lamp, 38.9 C.

From these few studies we can draw some tentative conclusions. Those lamps which emanate luminous and near infrared rays increase the temperature of the subcutaneous area more than the lamps whose emanations are particularly in the far infrared region. The 260-watt carbon filament lamp seems to be the most practical one of all of those which we employed to cause an elevation in subcutaneous temperature. The 1500-watt tungsten filament lamp is also an efficient instrument for subcutaneous temperature elevations. The so-called infrared lamp is a comparatively poor device for this purpose. An ordinary bathroom heater which was purchased in a chain drug store for the price of one dollar appeared to be more effective than the infrared lamp for the creation of subcutaneous temperature elevations.

The common use of the 1500-watt tungsten filament lamp is justified by the clinical results. The question arises, however, whether essentially the same results may not be secured through the use of a lamp of smaller wattage. Justification for the employment of a larger lamp may exist when it is necessary to cover a large part of the body surface. In most instances this is not necessary. We are then wasting four or five times the amount of money for electric current.

The total heat energy which can be applied to the skin is determined by the limit of physiologic tolerance rather than by the energy output of the lamp. The quantity of energy reaching the skin can be increased by moving the lamp nearer to its surface. Practically all the lamps on the market can give as much heating energy as the skin will tolerate. The ideal lamp would be one which gives the greatest amount of surface and subsurface heating with the least expenditure of electric current. From this point of view the ordinary 260-watt carbon filament lamp is as efficient as any now on the market.

Medical Study Trip to Hungary

At the invitation of the Hungarian Medical Postgraduate Committee of Budapest, Professor Emil de Grosz, President, and of the Association "Budapest Town of Medicinal Springs," Archduke Dr. Joseph Francis, President, a medical study trip to Hungary is being organized. The plans provide for a fortnight visit to Hungary during which there will be postgraduate lectures and demonstrations in English at the principal university clinics and at the municipal thermal baths and springs. Reduced railroad fares and hotel rates are granted by the Hungarian Government. The party will sail from New York on August 18, 1934, visiting Munich and Oberammergau en route. The return trip may be made, optionally, via Berlin, Paris, or Italy, arriving back in New York on September 30.

American physicians of good standing are invited to join. The American Committee of the study trip consists of Harlow Brooks, M. D., Chairman, Charles G. Kerley, M. D., Jerome M. Lynch, M. D., Wendell C. Phillips, M. D., and Erwin Torok, M. D. Richard Kovacs, M. D., 110 Park Ave., New York, is Secretary.

Book Reviews

Physical Treatment by Movement, Manipulation and Massage by James B. Mennell, M. A., M. D., B. C. (Cantab.) Pp. 618 with 274 illustrations including 32 plates, 8 in color, 2nd Edition, $6.50. Philadelphia, P. Blakiston's Son & Co., Inc., 1934.

A member of the Council on Physical Therapy of the American Medical Association recently said that as a matter of fact, 90 per cent of the necessary work in a general hospital, so far as physical therapy is concerned, can be accomplished by exercise, massage, muscle training and posture work with no other equipment than can be found in the ordinary home. This book gives the technic for massage and exercises better than any single volume published. If the physical therapist could have but one book we would certainly recommend the new "Mennell."

Mennell is one of the pioneers in this field. Wilson recently said: "Mennell of London learned Lucas-Championniere's methods at first hand and has continued to employ them and to advocate them with the conviction of a long and rich experience. His works on massage and the treatment of fractures are valuable contributions deserving the most careful study."

The first 300 pages of this book are devoted to the use of massage, relaxed movement, and exercises in the treatment of recent injuries. In this part of the book there is so much detail, so many minute instructions, such a variety of little things that count, and the minutiae are of such importance in the success or failure of this treatment that it is difficult to select the outstanding points. There are so many pitfalls for the unwary that one is rather overwhelmed by the number of possibilities for mistakes. Yet everything is so clearly and reasonably explained that one wonders why one has never thought of it before. The chief impression is to begin at the beginning and work watchfully, gently and progressively. This sounds simple and easy but it is not and the task set for the physicaltherapist is no easy one.

One finds many pet ideas upset, but the substitute offered is not only clear and convincing, but backed by years of successful experience, one can only drop the old ideas as quietly as possible and look for a chance to apply those of Mennell.

This book serves as the best text on this subject that has been written and it can be recommended without reservation to all those interested in the subject of physical therapy.

Physiological Health-School of Education Series, New York University, Edited by Jay B. Nash, Chairman, Department of Physical Education. Cloth, Pp. 308, $2.00, New York, A. S. Barnes & Co., Inc., 1933.

This is the fourth volume of a series on Interpretations of Physical Education. Health in this volume is considered in its physiological sense as the ability of the body to sustain adaptive effort. The basic elements of health and their relationship to physical education are presented. The building of organic power is through activity which brings into play the large muscle groups and as physical education is primarily concerned with the activities that involve these large muscle groups, its relationship to the building of organic power as the basis of health is very pertinent. In the removal of defects it is noted that the physical educator sees the human organism functioning under stress. This is the time that defects show up, and the physical educator has the responsibility of referring these cases to physicians for diagnosis and treatment. Another basic element of health is the removal of strains. Strains thought of in terms of worry and fear can never be removed directly; but are eliminated by substituting in the life of an individual as joyous activity.

Part II considers the forces and factors in building and maintaining health. There are chapters on the philosophical relationship of forces such as heredity, activity and environment by Dr. Shailer U. Lawton; on a measure of health—the capacity of an individual for work, by Dr. D. B. Dill; and the physical nature of mental processes by Dr. George W. Crile.

Part III is devoted to the consideration of health as a basic potential. Among other chapters are chapters on health as a basic potential for vocation by Dr. Ralph E. Pickett and health as a basis for leisure by Dr. Jay B. Nash.

Parts V and VI are on teaching and administration for health. There is an excellent bibliography.

Physical therapists are constantly concerned with giving a balanced physical education program. This volume is a series of articles by authorities in their fields on the basic elements of health and their relationship to physical education. Therefore this book should be of value to every physical therapist concerned with a health program.

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